DOCUMENT RESUME

ED 330 693	SP 033 021

AUTHOR	Liemohn, Wendell, Ed.
TITLE	Abstracts of Research Papers 1991, Presented at the Annual Convention of the American Alliance for Health, Physical Education, Recreation and Dance in the Research Consortium Meetings (San Francisco, California, April 3-7, 1991).
INSTITUTION	American Alliance for Health, Physical Education, Recreation and Dance, Reston, VA.
REPORT NO	ISBN-88314-504-9
PUB DATE	91
NOTE	344p.
AVAILABLE FROM	Publications sales, AAHPERD, 1900 Association Drive, Reston, VA 22091.
PUB TYPE	Reference Materials - General (130) -- Collected Works - Conference Proceedings (021)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Abstracts; *Athletics; *Dance Education; *Drug Education; Elementary Secondary Education; *Health Education; Higher Education; *Leisure Education; Motor Development; *Physical Education; Physical Fitness; Professional Associations; Research Reports; Sport Psychology; Testing
IDENTIFIERS	*AAHPERD

ABSTRACT

The research consortium program of the American Alliance for Health, Physical Education, Recreation and Dance is comprised of free papers, posters, symposia, and invited lectures. Of the approximately 450 research abstracts submitted for the 1991 research symposium, those recommended for presentation are included in this volume. The topics covered include: motor processing during rapid voluntary human movement; history and sociology of sport; health; measurement and assessment; activities for special populations; pedagogy; physical education; exercise physiology; psychology, history, and sociology of sport; motor control; health behaviors and health promotion; drug education; cholesterol; drug use; leisure; dance; and physical fitness. The conference program is also included. (AMH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED330693

SP033 021

ABSTRACTS

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

G. Anderson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Research Papers
1991
AAHPERD Convention

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

2

BEST COPY AVAILABLE

ABSTRACTS

of Research Papers 1991

Wendell Liemohn, Editor
University of Tennessee, Knoxville

Presented at the San Francisco, California Convention of
American Alliance for Health,
Physical Education, Recreation and Dance
in the Research Consortium Meetings

Copyright © 1991
American Alliance for
Health, Physical Education,
Recreation, and Dance
1900 Association Drive
Reston, Virginia 22091
ISBN-88314-504-9

Purposes of the American Alliance For Health, Physical Education, Recreation and Dance

The American Alliance is an educational organization, structured for the purposes of supporting, encouraging, and providing assistance to member groups and their personnel throughout the nation as they seek to initiate, develop, and conduct programs in health, leisure, and movement-related activities for the enrichment of human life.

Alliance objectives include:

1. Professional growth and development – to support, encourage, and provide guidance in the development and conduct of programs in health, leisure, and movement-related activities which are based on the needs, interests, and inherent capacities of the individual in today's society.
2. Communication – to facilitate public and professional understanding and appreciation of the importance and value of health, leisure, and movement-related activities as they contribute toward human well-being.
3. Research – to encourage and facilitate research which will enrich the depth and scope of health, leisure, and movement-related activities; and to disseminate the findings to the profession and other interested and concerned publics.
4. Standards and guidelines – to further the continuous development and evaluation of standards within the profession for personnel and programs in health, leisure, and movement-related activities.
5. Public affairs – to coordinate and administer a planned program of professional, public, and governmental relations that will improve education in areas of health, leisure, and movement-related activities.
6. To conduct such other activities as shall be approved by the Board of Governors and the Alliance Assembly, provided that the Alliance shall not engage in any activity which would be inconsistent with the status of an educational and charitable organization as defined in Section 501(c) (3) of the Internal Revenue Code of 1954 or any successor provision thereto, and none of the said purposes shall at any time be deemed or construed to be purposes other than the public benefit purposes and objectives consistent with such educational and charitable status.

Bylaws, Article III

TABLE OF CONTENTS

Preface vi

Reviewers vii

Convention Program xii

Abstracts 1

Index 294

PREFACE

The Research Consortium program is comprised of free papers, posters, symposia, and invited lectures; for this year's conference there are also three symposia on the theme drugs and drug education. Approximately 450 research abstracts were submitted for the free communication, poster, and/or symposia sessions under the auspices of the Research Consortium for the 1991 AAHPERD Convention in San Francisco; those abstracts which were recommended for presentation are published in this volume.

At the Business Meeting of the Research Consortium in New Orleans last year it was recommended that Review Panel Chairs be appointed in various subdisciplines to facilitate abstract reviews; this recommendation was adopted. Review Panel Chairs were nominated at a meeting of the Executive Board in Reston this past June and were subsequently appointed; their charge was to select reviewers and to coordinate the review process. To help the respective Review Panel Chairs pick their reviewers, names garnered from the (a) various associations of AAHPERD, (b) the Research Quarterly for Exercise and Sport editor as well as section editors, and (c) NASPE Academy chairs were forwarded to them; they also received names of prior abstract reviewers as well as names of individuals who had personally indicated that they wished to review program abstracts. The program schedule (including time and place) is provided following the list of reviewers; abstracts of the symposia are presented in the next section, followed by the abstracts for free papers and posters.

Thanks are extended to all those who submitted papers; thanks also are extended to the reviewers and paticularly the Review Panel Chairs, who gave so selflessly of their time and expertise. A special thanks to Jane Clark for her gracious assistance and for recommending the Review Panel Chair concept; the latter made my arduous task much more palatable. A particular thanks to Ray Ciszek of the Alliance staff, and his assistant Pam Grimmard; they were always most accommodating of any request for assistance I had. Thanks also to Joan Paul, my department head, for providing me with generous support. This support included Jo Allen, Departmental Secretary, and particularly my secretary, Glenda Dills; the latter typed the program and was extremely helpful in all facets. Martha Craig and Pam Swan (both graduate students) made important contributions; and Zhan Liu, also a graduate student, assisted me throughout the fall semester and truly made my task much easier.

Wendell Liemohn
President-Elect, Research Consortium
Department of Human Performance and Sport Studies
University of Tennessee
Knoxville, TN 37996-2700

REVIEWERS

Under each of the topical areas are listed the Review Panel Chairs (RPC); the latter are followed by a listing of the reviewers of the abstracts for each area.

ACTIVITIES FOR SPECIAL POPULATIONS

Paul Surburg (RPC), Indiana University, Bloomington
Ron Davis, Ball State University, Muncie
James Decker, East Carolina University, Greenville
Dale Ulrich, Indiana University, Bloomington
Gail Webster, Virginia Tech University, Blacksburg
Karen DePauw, Washington State University, Pullman
John Dunn, Oregon State University, Coravalis
Luke Kelly, University of Virginia, Charlottesville
Allen Burton, University of Minnesota, Minneapolis
David Poretta, Ohio State University, Columbus
Ron French, Texas Women's University, Denton
Pat DiRocco, University of Wisconsin, Lacrosse
Joseph Winnick, State University of New York, Brockport
Michael Horvat, University of Georgia, Athens
Gail Dummer, Michigan State University, East Lansing

BIOMECHANICS

Marlene Adrian (RPC), University of Illinois, Champaign-Urbana
Mark Grabiner, Cleveland Clinic Foundation, Cleveland, Ohio
Carole Zebas, University of Kansas, Lawrence
Sarah Smith, USOC Sports Sciences, Colorado Springs
Jackie Hudson, University of North Carolina, Greensboro
Ross Vaughn, Boise State University, Idaho
Sally Phillips, University of Maryland, College Park

BODY COMPOSITION

Phil Sparling (RPC), Georgia Institute of Technology, Atlanta
Scott Going, University of Arizona, Tucson
R. Gay Israel, East Carolina University, Greenville
Joyce Ballard, University of Texas, Tyler

DANCE

Judith Gray (RPC), San Mateo, California
Rayma Beal, University of Kentucky, Lexington
Dianne Howe, California State University, Irvine

EXERCISE PHYSIOLOGY

Kirk Cureton (RPC), University of Georgia, Athens

Mindy Millard-Stafford, Georgia Institute of Technology, Atlanta
Don Morgan, University of North Carolina, Greensboro
Jay Graves, University of Florida, Gainesville

HEALTH

Jim Eddy (RPC), University of Alabama, Tuscaloosa
Daniel Bibeau, University of North Carolina, Greensboro
Darrell Crase, Memphis State University, Memphis
William Creswell, University of Illinois, Champaign-Urbana
Carol Cummings, Rhode Island College, Providence
Judy Drolet, Southern Illinois University, Carbondale
Gene Ezell, University of Tennessee, Chattanooga
Joyce Fetro, ETR Associates, Santa Cruz, California
Stuart Fors, University of Georgia, Athens
Nick Galli, Rosylyn, New York
Joe Governali, State University of New York, Cortland
Jerrold Greenberg, University of Maryland, College Park
Charlotte Hendricks, University of Alabama, Birmingham
Betty Hubbard, University of Central Arkansas, Conway
Gerald Hyner, Purdue University, West Lafayette, Indiana
Nickloas Iammarino, Rice University, Houston
Mark Kittleson, Southern Illinois University, Carbondale
Molly Laflin, Bowling Green University, Bowling Green, Ohio
Lynnette Lawrence, University of North Carolina, Greensboro
David Macrina, University of Alabama, Birmingham
David Mason, Northern Illinois University, DeKalb
Gary Nelson, Center for Disease Control, Atlanta
Melody Noland, University of Kentucky, Lexington
Robert Olds, Kent State University, Kent, Ohio
Thomas O'Rourke, University of Illinois, Champaign-Urbana
Fred Peterson, University of Texas, Austin
James Robinson, University of Northern Colorado, Greeley
Mary Rose-Colley, Williamsport, PA
Laurna Rubinson, University of Illinois, Champaign-Urbana
Mary Sutherland, Florida State University, Tallahassee
Cynthia Symons, Kent State University, Kent, Ohio
Marlene Tappe, Purdue University, West Lafayette, Indiana
Mohammad Torabi, Indiana University, Bloomington
Robert Valois, University of South Carolina, Columbia
Jill Varnes, University of Florida, Gainesville
Elaine Vitello, Southern Illinois University, Carbondale
Mark Wilson, University of Georgia, Athens
G. Greg Wojtowicz, University of Alabama, Birmingham
Michael Young, University of Arkansas, Fayetteville

LEISURE

Carla Henderson (RPC), University of North Carolina, Chapel Hill
Deb Jordan, Southwest Texas State University, San Marcos
Chris Cashel, Oklahoma State University, Stillwater
Jaclyn Card, University of Missouri, Columbia
Sandy Little, Illinois State University, Bloomington

MEASUREMENT

Marilyn Looney (RPC), Northern Illinois University, DeKalb
Allen Jackson, North Texas State University, Denton
Jimmy Disch, Rice University, Houston
Judith Spray, American College Testing, Iowa City
Margaret Jo Safrit, University of Wisconsin, Madison
Bethany Shifflett, San Jose State University, California
Terry Wood, Oregon State University, Corvalis

MOTOR BEHAVIOR

Kathleen Williams (RPC), University of North Carolina, Greensboro
Daniel Corcos, Rush Medical College, Chicago
Barbara Hart, University of Wisconsin, Milwaukee
James Cauraugh, University of Florida, Gainesville
Tanya Toole, Florida State University, Tallahassee
Sinah Goode, Texas Women's University, Denton
Susann Doody, University of Northern Iowa, Cedar Falls
Jody Jensen, University of Oregon, Eugene
Kathie Haywood, University of Missouri, St. Louis
Jill Whitall, University of Wisconsin, Madison
Jere Gallagher, University of Pittsburgh
JoAnne Lazaras, University of Wisconsin, Madison
Mark Fischman, Auburn University, Auburn, Alabama
Noreen Goggin, University of North Texas, Denton
Richard Magill, Louisiana State University, Baton Rouge
T. Gilmour Reeve, Auburn University, Auburn, Alabama
Charles Shea, Texas A & M University, College Station

PEDAGOGY

Patt Dodds (RPC), University of Massachusetts, Amherst
Gayle Hutchinson, California State University, Chico
Allen Phillips, University of Northern Colorado, Greeley
Cynthia Carlisle, University of Northern Colorado, Greeley
Miguel Balboa, University of Northern Colorado, Greeley
Becky Pissanos, Bowling Green State University, Ohio
Pamela Allison, Bowling Green State University, Ohio
Tom Ratliffe, Florida State, Tallahassee

BEST COPY AVAILABLE

- Paul Schempp, University of Oregon, Eugene
- Marvin Scott, University of Maryland, College Park
- Murray Mitchell, Rutgers University, New Jersey
- Deborah Tannehill, Ohio State University, Columbus
- Sandra Stroot, Ohio State University, Columbus
- Mary O'Sullivan, Ohio State University, Columbus
- Linda Bain, California State University, Northridge
- Daryl Siedentop, Ohio State University, Columbus
- Stephen Silverman, University of Texas, Austin
- Kathy Graham, University of South Carolina, Columbia
- Judy Placek, University of Massachusetts, Amherst
- Hans van der Mars, Arizona State University, Tempe
- Thomas Templin, Purdue University, West Lafayette, Indiana
- Amelia Lee, Louisiana State University, Baton Rouge
- Judith Rink, University of South Carolina, Columbia
- Beverly Yerg, Florida State University, Tallahassee
- Rosalyn Edwards, University of Houston, Texas
- Karen Greenockle, University of Tennessee, Martin
- Debbie Howell, University of Central Arkansas, Conway
- Karyn Nelson, University of Idaho, Moscow
- Sandy Gangstead, Univ. of Southern Mississippi, Hattiesburg
- Sara Robinson, University of North Carolina, Greensboro
- Linda Lander, Bowling Green State University, Ohio
- Alison Dewar, Miami University, Oxford, Ohio
- Cathy Ennis, University of Maryland, College Park

PHYSICAL FITNESS

- Pat McSwegen (RPC), University of Missouri, Kansas City
- David Bassett, University of Tennessee, Knoxville
- Rich Sabeeth, Children's Mercy Hospital, Kansas City, Missouri

SOCIOCULTURAL ASPECTS OF SPORT AND PHYSICAL ACTIVITY

- David Wiggins (RPC), James Madison University, Harrisonburg, Virginia
- History/Philosophy:
  - Joan Paul, University of Tennessee, Knoxville
  - Larry Fielding, University of Louisville, Kentucky
  - Steve Hardy, University of New Hampshire, Durham
  - George Eisen, California State Polytechnic University, Pomona
  - Synthia Slowikowski, University of Illinois, Champaign-Urbana
  - Joan Hult, University of Maryland, College Park
- Sociology of Sport:
  - Dean Anderson, Iowa State University, Ames
  - Mary McElroy, Kansas State University, Manhattan

Susan Greendorfer, University of Illinois, Champaign-Urbana
Janet Harris, University of North Carolina, Greensboro
Stephen Figler, California State University, Sacramento
Cynthia Hasbrook, University of Wisconsin, Milwaukee

SPORT PSYCHOLOGY

Joan Duda (RPC), Purdue University, West Lafayette, Indiana
Debra Crews, University of North Carolina, Greensboro
David Dzewaltowski, Kansas State University, Manhatten
Vicki Ebbeck, Oregon State University, Corvalis
Diane Gill, University of North Carolina, Greensboro
Howard Hall, Syracuse University, New York
Edward McAuley, University of Illinois, Champaign-Urbana
Linda Petlichkoff, Boise State University, Idaho
Robin Vealey, Miami University, Oxford, Ohio
Maureen Weiss, University of Oregon, Eugene
Sally White, University of New Hampshire, Durham

In addition to reviewers from the appropriate review panel, the following individuals served as reviewers of Symposia and/or served as a fourth reviewer of Free Communication/Poster submissions:

Rosemary Aten, Western Illinois University, Macomb
Wendy Bubb, University of Tennessee, Knoxville
Darryl Crase, Memphis State University, Tennessee
James Eddy, University of Alabama, Tuscaloosa
Karla Henderson, University of North Carolina, Chapel Hill
Sandy Putman, University of Tennessee, Knoxville
Craig Wrisberg, University of Tennessee, Knoxville
Emily Wughalter, New York University, New York

RESEARCH CONSORTIUM PROGRAM

THURSDAY, APRIL 4, 1991

RESEARCH CONSORTIUM: McCLOY LECTURE

7:30 - 9:00 a.m. —

RESEARCH CONSORTIUM SYMPOSIUM: PAST, PRESENT, AND FUTURE MOTOR CONTROL AND EXPERIMENTAL DESIGN CONSIDERATIONS INFLUENCING CHANGES IN MOTOR PROCESSING DURING RAPID VOLUNTARY HUMAN MOVEMENT

9:00 - 10:15 a.m.—Convention Center, Rooms 250 & 262

ORGANIZER: Pamela Beehler, The University of Texas, Arlington
SPEAKERS:

A Review of Fractionated Reaction Time Findings Demonstrating Changes in Motor Processing during Rapid Movement Initiation—Pamela Beehler, The University of Texas, Arlington and Joy Hendrick, State University College of New York, Cortland

Neuromuscular Mechanisms Underlying Rapid Movement Initiation: What's Going on in There?—Gary Kamen, Boston University

The Influence of Experimental Design upon Changes in Motor Processing during Rapid Movement Initiation—Harold Morris, Indiana University, Bloomington

Directions of Future Research Investigating Changes in Motor Processing during Rapid Movement Initiation—David Koceja, Indiana University, Bloomington and Jean Burke, University of South Carolina, Columbia

RESEARCH CONSORTIUM FREE PAPERS: HISTORY/SOCIOLOGY

9:00 - 10:15 a.m. - Convention Center Rooms 270 & 272
PRESIDER: Joan Paul, University of Tennessee, Knoxville

9:00-9:15 a.m.—	"Sporting Event of the Year;" The Howard Lincoln Football Classic, 1919-1929—David Wiggins, George Mason University, Fairfax, Virginia
9:15-9:30 a.m.—	The Integration of Professional Basketball 1920-1950—John Schleppi, University of Dayton, Ohio
9:30-9:45 a.m.—	Idealized Middle Class Sport Impaled on its Own Sword of Boosterism: Organized LaCrossee in Two Towns, 1871-1890—Nancy Bouchier, Kansas State University, Manhattan
9:45-10:00 a.m.—	Controlling Bodies: Faculty, Physicians, and Student Life at Turn-of the Century Women's Colleges—Susan Zieff, University of California, Berkley
10:00-10:15 a.m.—	The Production Era Model and American Sport 1890 1910—Lawrence Fielding; Brenda Pitts and Lori Miller, University of Louisville, Kentucky

RESEARCH CONSORTIUM POSTER SESSION: HEALTH

9:00 - 10:15 a.m.
PRESIDER: Cynthia Symons, Kent State University, Kent, Ohio

1. An Analysis of Users of Mass Communication-Based Worksite Health Promotion Program Written Materials—Thomas Golaszewski, The Center for Corporate Health, Inc., and Louis Yen, The Fitness Research Center, Reston, Virginia
2. Cancer Prevention Awareness of Economically Disadvantaged Adolescents—R. Scott Olds, Kent State University, Kent, Ohio
3. Health Needs Assessment of Korean Students at the Pennsylvania State University—Eun-Jin Choi and Larry Olsen, Pennsylvania State University, University Park
4. Community Competence in Delivery of Health Related Services and Impact on Years of Potential Life Lost—Evelyn Knight; Hans Johnson and Don Holbert, East Carolina University, Greenville, North Carolina
5. Stability in Use of Activity Structures in High School Health Education Classes—David Wiley, Southwest Texas State University, San Marcos
6. Age Differences Among College Students Relative to Substance Use—Elizabeth Edmundson and Tony Haden, The University of Texas, Austin
7. A Preliminary Study of Job-Related Burnout Among Health Education Specialists in Taiwan—W. William Chen, University of Florida, Gainesville, Laura Lu, National Taiwan Normal University, Taiwan and Jenn-Chang Liou, University of Florida, Gainesville

BEST COPY AVAILABL

8. The Burnout Syndrome in University Professors—Terri Mulkins Manning, The University of North Carolina, Charlotte
9. Effects of Nutritional Status on Children's Strength Measures and Cognitive Behavioral Functioning—George White; Robert Hefley and David Barrett, Clemson University, Clemson, South Carolina and Mark Maneval, University of Southern Mississippi, Hattiesburg
10. The Effects of Rewards and Feedback on Intrinsically Motivating Physical Activity—William Rutherford; Tzerlin Prong and Charles Corbin, Arizona State University, Tempe
11. The Effect of Public Cholesterol Screening Programs on Health Behaviors—Kathleen Gulick; Larry Hensley and Forrest Dolgener, University of Northern Iowa, Cedar Falls
12. Development and Implementation of a Health Promotion Program for a Small Business—Marianne Neighbors and Rick Guyton, University of Arkansas, Fayetteville
13. The Relationship of AIDS' Knowledge to the Sexual Behavior and Attitudes of High School and College Students—Barbara Thompson, Florida A&M University, Tallahassee, Dewayne Johnson, Florida State University, Tallahassee and Virden Evans, Florida A&M University, Tallahassee
14. The Impact of a Scheduled Fitness Workout on Fitness Scores of Middle School Boys and Girls—Dewayne Johnson; Susan Lynn; Jeff Hogan and Al Blizzard, Florida State University, Tallahassee
15. Personal Incentives and Health: Differences in Groups Defined by Gender and Participation Status in a Worksite Health Screening—Linda Stonecipher, University of Texas, Arlington and Marlene Tappe, Purdue University, West Lafayette, Indiana
16. Changes in Health Practices Following a Worksite Health Screening: Differences Between Participants and Nonparticipants—Gerald Hyner, Purdue University, Linda Stonecipher, University of Texas-Arlington and Roseann Lyle, Purdue University, West Lafayette, Indiana
17. Perceived Barriers to Health Practices: Differences in Groups Defined by Gender and Participation Status in a Worksite Health Screening—Marlene Tappe, Purdue University, West Lafayette, Indiana and Linda Stonecipher, University of Texas, Arlington
18. Comparison of Methods for Teaching Self-Evaluation of Healthful Levels of Body Fatness—Lisa Chase; Charles Corbin and William Rutherford, Arizona State University, Tempe
19. Exploratory Investigation of the Relationship Between Female College Students' Level of Exercise and Five Premenstrual Symptoms—Susan Immel, Iowa State University, Ames
20. Open Airways as an Educational Intervention to Help Manage Asthma in Children—Esther Moe; Jay Eisenberg; Michael Wall, Oregon Health Sciences University, Portland and William Vollmer;

Victor Stevens and Jack Hollis, Kaiser Permanente Center for Health Research

21. Examination of the Factor Structure of the Health Belief Model Inventory Utilizing Data Collected From Employees of a Medical Center—Dean Anderson and Charles Cychosz, Iowa State University, Ames
22. Perceptions of Physical Appearance and Their Relationship to Height, Weight, and Skinfold Measurements Among Children—Charles Corbin and Robert Pangrazi, Arizona State University, Tempe and Gene Peterson and Debbie Pangrazi, Mesa Public Schools, Mesa, Arizona
23. Gender Differences in the Factor Structures of Alcohol Use, Motives, Attitudes and Consequences Among College Students—Eugene Deisinger; Charles Cychosz and Fred Borgen, Iowa State University, Ames
24. Health Practices of Native American 8th and 10th Grade Students—Larry Olsen; MinQi Wang and Michael Ludwig, Pennsylvania State University, University Park
25. The Importance of Decision Factors, Nutritional Attitudes, and Knowledge in Cafeteria Food Choices of College Students—Liane Summerfield and Rebecca Pliske, Marymount University, Arlington, Virginia
26. Acquaintance Rape and Sexual Aggression as Portrayed on the Television Programs—N. Ruth Ahia, University of Arkansas, Fayetteville
27. Assessment of Knowledge and Attitudes About Alcohol and Other Drugs Among Elementary and Middle School Teachers—M. Wessel; D. Videto; H. Travis; S. Stewart and H. Amato, James Madison University, Harrisonburg, Virginia
28. Relaxation/Cognitive vs. Fitness Education for Stress and Burnout Among Secretaries—Lawrence Rohner and Jeffrey Brandon, New Mexico State University, Las Cruces
29. Prediction of Stress and Burnout Among University Secretaries—Jeffrey Brandon and Lawrence Rohner, New Mexico State University, Las Cruces
30. Academic Coursework and Professional Competencies Expected of Entry Level and Experienced Health Promotion Professionals as Viewed by Employers and University Faculty Members—John Schmitt; William Weinberg and Cheryl Kolander, University of Louisville, Kentucky
31. Adventure Therapy: Perceptions of Patients, Therapists, and Psychiatrists—Camille Bunting, Texas A&M University, College Station
32. Adolescent Dieting and Weight Loss Practices—Christina Perry-Hunnicutt, University of Nebraska, Lincoln

BEST COPY AVAILABL

33. Attitudes of University Employees for an On-Campus Wellness/Health Promotion Program: Results From the Wayne State University Survey—S. Singleton; J. Fitzgerald; H. Engels and J. Wirth, Wayne State University, Detroit, Michigan
34. The Effects of Menstrual Cycle Phase on Cardiovascular Reactivity in Oral Contraceptive Users and Non-Users with a Parental History of Hypertension—Carolyn Silvey and Roseann Lyle, Purdue University, West Lafayette, Indiana
35. Factors Influencing Family Choice of Health Care in a Developing Nation—Anna Harding, and Rebecca Donatelle, Oregon State University, Corvallis
36. The Importance, Feasibility, Identification, and Description of Program Components in Existing Health Promotion/Wellness Programs at Public Schools Within the State of Wisconsin—Donna Champeau and Richard Detert, University of Wisconsin, LaCrosse
37. The Development of Computer Applications in Health: Past and Future Trends—R. Tricker, Oregon State University, Corvallis, C. Miller, Kansas Department of Personnel Services and R. Donatelle, Oregon State University, Corvallis
38. Health Knowledge, Attitudes, and Practices of Seventh Grade Students in South Carolina—Ann Slater, University of North Carolina, Charlotte
39. Professional Preparation Curriculum for Corporate Health Promotion: An Evaluation by Entry Level Professionals—Catherine Kennedy, Colorado State University, Fort Collins
40. Differences in Blood Pressure: Longitudinal Study of a childhood Population—J. Gough and C. Westerfield, The University of Alabama, Tuscaloosa
41. Demographic Determinants of Seatbelt Use From The BRFSS Data—James Eddy, University of Alabama, Tuscaloosa, Catherine Teare Ketter, Georgia College, Milledgeville, Barbara Barker and Eugene Fitzhugh, University of Alabama, Tuscaloosa
42. Heavy Consumption of Alcohol. Is There a Relationship Between This and Depression, Lack of Social Support, and Consideration of Suicide?—Cheryl Graham and Richard Gibbs, Oregon State University, Corvallis
43. A Longitudinal Examination of Teacher Burnout—Stephen Nagy and M. Christine Nagy, University of Alabama, Tuscaloosa
44. Relationship Between Selected Psychosocial Factors with Quality of Life Among Heart Transplant Recipients: Implications for the Health Educator—Dalen Duitsman; Charles Cychosz, Iowa State University, Ames, Mohammad Torabi, Indiana University, Bloomington

RESEARCH CONSORTIUM FREE PAPERS: MEASUREMENT

10:45 - Noon - Convention Center, Rooms 250 & 262
PRESIDER: Charles Ansorge, University of Nebraska, Lincoln

10:45-11:00 a.m.—	Effects of Item Dependency on IRT Parameter Estimation for the Binomial Trials Model—Marilyn Looney, Northern Illinois University, DeKalb and Judith Spray, American College Testing, Iowa City
11:00-11:15 a.m.—	The Calibration of a Sit-Up Task Using the Rasch Poisson Counts Model—Weimo Zhu, Wayne State University, Detroit, Michigan, Margaret Safrit, University of Wisconsin, Madison
11:15-11:30 a.m.—	The Utility of Item Response Theory in Evaluating Mastery Classification of Dichotomously Scored Psychomotor Skill Data—Emily Cole, Indiana University, Bloomington, Terry Wood and John Dunn, Oregon State University, Corvallis
11:30-11:45 a.m.—	The Reliability of the Mile, 3/4 Mile, and 1/2 Mile Distance Run Test for Children Grades K-4—Roberta Rikli, California State University, Fullerton, Clayre Petray, California State University, Long Beach and Ted Baumgartner, University of Georgia, Athens
11:45-12:00 noon—	Validity and Reliability of the 20 Meter Shuttle Test in American Females 19-34 Years of Age—Rene LaMontagna, Vincennes University, Vincennes, Indiana and Tom Ball, Northern Illinois University, DeKalb

RESEARCH CONSORTIUM FREE PAPERS: ACTIVITIES FOR SPECIAL POPULATIONS

10:45 - Noon - Convention Center, Rooms 270 & 272
PRESIDER: Michael Horvat, University of Georgia, Athens

10:45-11:00 a.m.—	Situational Anxiety in Special Olympic Athletes—David Porretta, The Ohio State University, Columbus, William Moore, East Carolina University, Greenville, Connie Sappenfield, Coordinator of Special Populations and Special Olympics, Greenville, North Carolina
11:00-11:15 a.m.—	Effect of Posture on Peak Exercise Hemodynamics of Quadriplegics—Stephen Figoni; Satyendra Gupta; Agaram Suryaprasad and Roger Glaser, Veterans

Affairs Medical Center and Wright State University School of Medicine, Dayton, Ohio

11:15-11:30 a.m.— Effects of a Reinforcement-Based Exercise Program on Selected Fitness Parameters and Work Productivity in Adults with Mental Retardation—Ron Croce, University of New Hampshire, Durham and Michael Horvat, University of Georgia, Athens

11:30-11:45 a.m.— A Comparison Between Anthropometric Regression Equations and Hydrostatic Weighing for Predicting Percent Body Fat of Adult Males with Down Syndrome—Steven Ovalle, Oregon State University, Emily Cole, Indiana University, Bloomington, Michael Climstein and John Dunn, Oregon State University, Corvallis

11:45-12:00 noon— Segmental Acceleration Patterns of Elite Wheelchair Propulsion—Carol Pope, Texas Christian University, Fort Worth and Jerry Wilkerson, Texas Woman's University, Denton

RESEARCH CONSORTIUM POSTER SESSION: PEDAGOGY

10:45 - Noon
PRESIDER: Deborah Tannehill, Ohio State University, Columbus

1. Teachers' Goals for Student Learning in Racially Diverse Schools—Catherine Ennis, University of Maryland, College Park, Juanita Ross, Prince George's County Schools, Landover, Maryland
2. Assessment of a Physical Education Intervention by Specialists and Trained Classroom Teachers—Thom McKenzie; Nell Faucette; James Sallis and Julia Roby, San Diego State University, California
3. Teacher Emitted Verbal Prompts and Feedback - Is More or Less Better?—Tom C. Ormond, Ithaca College, Ithaca, New York
4. The Immediate Effects of Peer Teaching Upon Novice Instructor Self-Perceptions of Confidence, Awareness and Competence—A. Brian Nielsen and Linda Thompson, University of Alberta, Edmonton, Canada
5. Knowledge Base and Motor Skill Diagnosis—Victor Pinheiro, University of Akron, Akron, Ohio
6. Continuity Among Teaching Objectives, Classroom Behavior and Student Learning Through the Teaching Feedback Model—Thomas Wandzilak; Lynn Mortensen; Ronald Bonnstetter and Shawnna Kramer, University of Nebraska, Lincoln
7. Teacher/Student Dyadic Interaction of Elementary Physical Education Student Teachers—Dale DeVoe, Colorado State University, Fort Collins

8. Radio-Cueing: A Technique for Concurrent Intervention with Pre-Service Teachers—Robert Hautala, University of Nebraska, Omaha
9. Academic Learning Time in Canadian Secondary School Physical Education Classes—Linda Thompson and Larry Beauchamp University of Alberta, Edmonton, Canada and Paul Darst, Arizona State University, Tempe
10. The Development and Evaluation of Self-Assessment Skills Among Experienced Physical Educators—Debra Berkey and Ray Cool, Western Michigan University, Kalamazoo
11. College/University Requirements of Cooperating Teachers Across Canada and the United States—Patrick Ryan and Debra Berkey, Western Michigan University, Kalamazoo
12. The Effect of an Instructional Videotape on the Ability of Physical Education Majors to Diagnose Errors in the Overarm Throwing Pattern—Susan Wilkinson, University of Illinois, Chicago
13. The Comparative Effectiveness of Machine Pitch and Player Pitch Delivery Methods for Developing Batting and Fielding Skills in Youth League Baseball—William Weinberg, University of Louisville, Kentucky
14. Knowledge and Performance in Badminton: A Study of Students with Different Entry Characteristics—Nyit Chin Keh and Amelia Lee, Louisiana State University, Baton Rouge
15. The Effect of a Clinical Teaching Experience on Preservice Teachers' Planning and Teaching Behaviors—Mary Marks, California State University, Los Angeles and Mark Byra, University of Wyoming, University Station
16. The Effects of Cooperative and Individualistic Goal Structures on Tennis Skills of Beginning Students—Joseph Brown, Stetson University, Texas and Jack Chevrette, Texas A&M University, College Station
17. Comparison of Continuous Recording to Interval Recording Utilizing Varying Lengths of Rest Periods—Michael Stewart and David Destache, University of Nebraska, Omaha
18. Practice Behaviors of Alberta Soccer Coaches—M. Dyck, Trinity Western University, Canada, M. Parker, University of North Dakota, Grand Forks, C. Pemberton, University of Missouri, Kansas City and C. Humphries, University of North Dakota, Grand Forks
19. The Role of Content Knowledge in Teaching Physical Education—Melinda Solmon; Amelia Lee and Katherine Hill, Louisiana State University, Baton Rouge
20. Learned Helplessness: A Case Study in Physical Education—Mary Walling, Purdue University, West Lafayette, Indiana
21. The Effect of Two Treatment Conditions on the Accurate Observation of Mature Patterns for Overhand Throwing and Catching—Elisa Salazar-Solis, Universidad Nacional de Costa Rica and Lynda Randall, Cali-

fornia State University, Fullerton

22. The Wellness, Efficacy, Stress and Effectiveness of Physical Education Teachers: A Preliminary Study—Paul Paese, Tinker Murray, Steven Furney and Charles Johnson, Southwest Texas State University, San Marcos
23. Self-Cueing the Mechanics of the Return of Serve in Tennis—Dennis Landin and David Cutton, Louisiana State University, Baton Rouge
24. The Effects of Goal Setting on Selected Verbal Behavior of a Physical Education Student Teacher—Mary Sariscsany, Kent State University, Kent, Ohio
25. Insight into the Socialization of Beginning Physical Education Teacher Educators—Kay Williamson, University of Illinois, Chicago
26. Attitudes and Perceptions of Senior High School Physical Education Curricula—Ross Friesen, University of Kansas, Lawrence, L. Marlene Mawson, Illinois State University, Normal and Carol Church, Lawrence, Kansas Public Schools
27. Preservice Physical Education Teachers' and Preservice Elementary Classroom Teachers' Observations During an Unguided Field Experience—Debbie Howell and Hollie Harris, University of Central Arkansas, Conway

RESEARCH CONSORTIUM/AMERICAN ACADEMY OF PHYSICAL EDUCATION: INVITED LECTURE

2:00 - 3:15 p.m. - Convention Center, Rooms 250 & 262

PRESIDER: Roberta Rikli, California State University, Fullerton

Measurement Malpractice and Malarkey, Margaret J. Safrit, University of Wisconsin, Madison

RESEARCH CONSORTIUM FREE PAPERS: EXERCISE PHYSIOLOGY—METABOLIC RESPONSE

2:00 - 3:15 p.m. - Convention Center, Rooms 270 & 272
PRESIDER: Phil Sparling, Georgia Institute of Technology, Atlanta

2:00-2:15 p.m.— Effects of Caffeine on Metabolic Responses of Aerobically Trained Males During Prolonged Exercise at Low and Moderate Aerobic Intensities—Hermann Engels, Wayne State University, Detroit, Michigan and Emily Haymes, Florida State University, Tallahassee

2:15-2:30 p.m.—	Relationship Between VO_2 Max and Running Economy in Elite Long-Distance Runners—Don Morgan, The University of North Carolina, Greensboro and Jack Daniels, State University of New York at Cortland
2:30-2:45 p.m.—	Magnitude and Duration of Postexercise Energy Expenditure Following Upper Body Exercise—Darlene Sedlock, Purdue University, West Lafayette, Indiana
2:45-3:00 p.m.—	Weight Loss of Obese Women on the Thermic Effect of Exercise—Z. Kendrick; C. Chesmel; D. Feldman; D. Birdsall; G. Foster and T. Wadden, Temple University, Philadelphia and Obesity Research Center, University of Pennsylvania, Philadelphia
3:00-3:15 p.m.—	Resting Energy Expenditure Measurement: Portable Accelerometer Versus Indirect Calorimetry—Swapan Mookerjee, State University of New York College, Brockport, New York

RESEARCH CONSORTIUM POSTER SESSION: PSYCHOLOGY, HISTORY and SOCIOLOGY OF SPORT

2:00 - 3:15 p.m.
PRESIDER: Susan Greendorfer, University of Illinois, Champaign-Urbana

1. The Relationships of Gender, Level of Sport Involvement, and ParticipationMotivation to Goal Orientation—Sally White, University of New Hampshire, Durham, Joan Duda, Purdue University, West Lafayette, Indiana and Caroline Sullivan, University of New Hampshire, Durham
2. The Influence of Player Status on Achievement Goal Orientations, Perceived Ability, and Cost-Benefits of Involvement—Linda Petlichkoff and Jay Larshus, Boise State University, Idaho
3. Controlled Exercise Arousal and Competitive Anxiety as Related to a Four Choice, Precue Reaction-Time Task—Trent Gabert and Steven Ingraham, University of Oklahoma, Norman
4. Effect of Progressive Relaxation on Maximal Muscle Strength and Power—E. Pierce; N. Eastman; Tracey Lyng and R. McGowan, University of Richmond, Virginia
5. The Effect of Exercise Intensity on Anxiety and Mood States—Ben Abadie, Mississippi State University and Lois Hale, University of Texas, Permian Basin
6. Social Facilitation of Cold Pressor Pain Tolerance in College and Youth Sport Athletes—Bill Kozar, Boise State University, Idaho, Russell Lord, Eastern Montana College, Billings and Keith Whitfield, McNeese

State University, Lake Charles, Louisiana

7. Cross Validation of the Physical Self-Perception Profile—Christopher Malone and Don Kirkendall, State University of New York College, Cortland
8. Anxiety in Typical Sport Settings: A Survey of Athletes in Five Sports—J. Dunn and A. Brian Nielsen, University of Alberta, Edmonton, Alberta, Canada
9. Inhabiting Level Effects on Girls' Satisfaction, Involvement, and Affective Expression in a Game Setting—Melissa Heaton, University of Northern Iowa, Cedar Falls
10. Sport Specific Response Set Modifications for the Maslach Burnout Inventory—Steven Houseworth; Kevin Burke; Richard Hawes and Richard Calvert, Illinois State University, Normal
11. The Effectiveness and Transferability of Four Learning Strategies on Achievement in Self-Paced Discrete, Serial and Continuous Motor Task—Charmaine DeFrancesco, Florida International University, Miami
12. Gender Comparisons of Physical Self-Esteem—Don Kirkendall and Christopher Malone, State University of New York College, Cortland
13. Gender as a Criterion in the Rating and Selection of Sport Management Interns—Jacquelyn Cuneen and Joy Sidwell, Bowling Green State University, Bowling Green, Ohio
14. Predictors of Academic Success for College-Bound Athletes—Terese Stratta and Charlotte West, Southern Illinois University, Carbondale
15. Perceived Benefits and Consequences of Anabolic Steroid Use in Bodybuilding—Tracy Olrich, Michigan State University, East Lansing
16. The Effect of Academic Requirements for Participation in Extracurricular Activities on Football and Volleyball Teams in Three South Carolina School Districts—Dana Espinosa, College of Charleston, South Carolina and Peter Graham, University of South Carolina, Columbia
17. Differential Media Coverage of Men's and Women's Intercollegiate Basketball and the Underlying Gender Ideology—Elaine Blinde; Rebecca Sankner and Lingling Han, Southern Illinois University, Carbondale and Susan Greendorfer, University of Illinois, Urbana-Champaign
18. Athletics in the Social Value System of High School Girls—Alan Goldberg and Timothy Chandler, Syracuse University, New York
19. Teachers and Coaches at Risk: Personal Insurance Policies May Help—Cheryl Kolander, University of Louisville, Kentucky, Joy Hendrick, State University College, Cortland, and Joni Grayson, Robinson-Conner Insurance, Louisville, Kentucky
20. Recruitment and Selection of Athletes in the Soviet Union—Stephen Jefferies, Central Washington University, Ellensburg
21. "The Bench": An Exploratory Study of Sport Team Socialization—M. De Furia, Syracuse University, New York, Bernard Oliver and David

Bacharach, St. Cloud State University, Minnesota

22. Social Power Orientation of Male and Female High School Basketball Coaches—Elizabeth Hall, Texas Tech University, Lubbock and J. Edward Burkhardt, Southwest Texas State University, San Marcos
23. Attitudes Toward Steroid Use Among Amateur Athletes—Jerald Floyd; Belinda Wholeben and Corenna Cummings, Northern Illinois University, DeKalb
24. Factors Which Influence Job Stability in College Football Coaching—John Vraa, Hamline University, St. Paul, Minnesota, Cynthia Pemberton, University of Missouri, Kansas City, Melessa Parker and Sandra Modisett, University of North Dakota, Grand Forks
25. Healthy Pleasures: A New Paradigm for Promoting Exercise Behavior—Mary Steinhardt and Laura Bates, The University of Texas, Austin
26. Living the Dream . . . A Sociohistorical Analysis of Professional Women Baseball Players 1940 - 1950—Karen Weiller, University of North Texas, Denton Higgs and Catriona Higgs, Slippery Rock University, Slippery Rock, Pennsylvania
27. American Women Enter the Olympic Movement: Coincidence or Design—Paula Welch, University of Florida, Tallahassee
28. Student Interaction in Contact Aquatic Activity—Susan Dempf, Syracuse University, New York
29. "The Study of Equity-Based Hiring Trends for High School Physical Education Teachers in the United States."—Bonnie Hulstrand, University of Idaho, Moscow
30. Using Social Learning Theory to Predict Physical Fitness—Daniel Adame; Steven Cole; Thomas Johnson; Stephen Nowicki and Haukur Matthiasson, Emory University, Atlanta, Georgia and Maher Abbas, Stanford University, California
31. Ethnic Identity and Ethnicity of Soccer Clubs in Australia—Christopher Hallinan, University of Alabama, Tuscaloosa and Brian Downes, University of Wollongong, Australia
32. A Sociology of Auto-Racing in the Film Medium - "Grand Prix" to "Days of Thunder"—Scott Crawford, Eastern Illinois University, Charleston

FRIDAY, APRIL 5, 1991

RESEARCH CONSORTIUM SYMPOSIUM: WHAT'S THE USE OF TRYING: A MODEL FOR EXPLAINING LEARNED HELPLESSNESS IN PHYSICAL EDUCATION

10:45 - Noon, Convention Center, Rooms 250 & 262

ORGANIZER: Thomas Martinek, University of North Carolina, Greensboro

BEST COPY AVAILABLE

SPEAKERS:

A Model for Explaining Learned Helplessness in Physical Education—Thomas Martinek, University of North Carolina, Greensboro

Causal Attributions of Performance Outcomes and Task Persistence of Learned Helpless Students—Joseph Griffith, III, University of North Carolina, Greensboro

Learned Helplessness: A Case Study of a Sixth Grade Physical Education Student—Mary Walling, Purdue University, West Lafayette, Indiana

The Effects of an Attributional Re-Training Intervention Plan on Exceptional Children in Physical Education—Anne Sheehan, Altamahaw Ossipee Elementary School, North Carolina

RESEARCH CONSORTIUM FREE PAPERS: MOTOR CONTROL

10:45 - Noon - Convention Center, Rooms 270 & 272
PRESIDER: Gary Kamen, Boston University

10:45-11:00 a.m.—	Preoperative and Postoperative Assessment of Surgical Intervention for Equinus Gait in Children with Cerebral Palsy—Bruce Etnyre, Rice University, Houston, Texas, Carol Chambers and Nancy Scarborough, Shriner's Hospital for Crippled Children
11:00-11:15 a.m.—	Longitudinal Study of the Effect of Vision on Posture During the Development of Independent Stance—Heidi Sveistrup and Marjorie Woollacott, University of Oregon, Eugene
11:15-11:30 a.m.—	Control of a Ground-Level Ball as a Function of Skill Level and Sight of the Foot—Mark Fischman and Bill Barfield, Auburn University, Auburn, Alabama
11:30-11:45 a.m.—	Concurrent Cognitive and Motoric Skill Interaction—Jill Whitall, University of Wisconsin, Madison
11:45-12:00 noon—	Spatial Precuing and Fractionated Reaction Time—James Cauraugh, Dapeng Chen and Greg Goodwin, University of Florida, Gainesville

RESEARCH CONSORTIUM POSTER SESSION: EXERCISE PHYSIOLOGY

10:45 - Noon
PRESIDER: Don Morgan, University of North Carolina, Greensboro

1. The Effects of Two Different Bouts of Weight Lifting on Serum Testosterone—Glen Johnson; Rob Schwab; Terry Housh and James Kinder, University of Nebraska, Lincoln
2. Muscle Enzyme Efflux in Response to Repeated Games of Baseball Pitching—Jeffrey Potteiger; Daniel Blessing and G. Dennis Wilson, Auburn University, Alabama
3. Event Order in the Biathlon Does Not Have an Effect on Metabolic Response—J. Ledbetter and A. Jackson, University of North Texas, Denton
4. Exercise Effects on LDL Clearance—R. Westerfield and T. Mego, The University of Alabama, Tuscaloosa
5. Coenzyme Q10's Effect on Maximal Exercise Capacity—Joanne Roberts, Texas A & M University, College Station
6. Heart Size and Wall Thickness in Women Basketball Athletes After Detraining—Stephen Crouse; James Rohack and Dennie Jacobsen, Texas A&M University, College Station
7. Potassium Content of the Fat-Free Body: Effects of Gender, Physical Activity, Maturation, and Age—M. Slaughter; C. Christ; R. Boileau and R. Stillman, University of Illinois, Urbana-Champaign
8. Age Related Differences in Mid-Shaft and Distal Radial Bone Mineral Content and Bone Mineral Index in Women—C. Christ, University of Illinois, Urbana-Champaign, J. Johnson, Longwood College, Farmville, Virginia, M. Slaughter; R. Boileau; R. Stillman and B. Massey, University of Illinois, Urbana-Champaign
9. Effect of Music on Heart Rate, Perceived Exertion, and Blood Lactate During Treadmill Running—Leon Szmedra and David Bacharach, St. Cloud State University, St. Cloud, Minnesota, Serge Von Duvillard, University of Lowell, Lowell, Massachusetts, Jim Meng; Mark Kellish; John Fatouros and Phil Buckenmeyer, Syracuse University, Syracuse, New York
10. Effects of Retro Running on Flexibility and Hamstring/Quadricep Strength Ratio—David Bacharach, St. Cloud State University, St. Cloud, Minnesota and Susan Korchak, Syracuse University, Syracuse, New York
11. Does Cross Training Impact Prediction of Triathlon Performance?—Mary Whitman, The Miriam Hospital, North Kingston, Rhode Island, Bo Fernhall and Thomas Manfredi, The University of Rhode Island, Kingston
12. Metabolic Analysis of Isotonic Exercise Performed at two Resistances and Two Cadences—R. Liverman, Illinois State University, Normal

and W. Hurst, Modesto, California

13. Energy Cost During Three Different Aerobic Dance Routines—Brenda Reeves and Lynn Darby, Bowling Green State University, Bowling Green, Ohio
14. Estimation of Submaximal Training Intensity From Measured Maximal Oxygen Uptake in Sedentary Middle-Aged Males: Is It Valid?—Robert Lowe; Dennie Jacobsen and Stephen Crouse, Texas A&M University, College Station
15. Effects of Walking Duration on Excess Post Exercise Oxygen Consumption—Linda Chitwood; Robert Moffatt; Brenda Marques and Dae Lee, Florida State University, Tallahassee
16. Effects of Exercise and Diet on Blood Lipids in Middle-Aged Active Women Either Taking or Not Taking Hormone Replacement Therapy—Edwyna Pace Testerman and Stephen Hotard, University of Southwestern Louisiana, Lafayette, Ronald Byrd, Louisiana State University, Shreveport; Denis Tallini, Our Lady of Lourdes Hospital and Paula Williams, University of Southwestern Louisiana, Lafayette
17. Replicability of Reflotron^{R} Serum Cholesterol Measurements—Leonard Kaminsky and Mitchell Whaley, Ball State University, Muncie, Indiana
18. Circadian Rhythms and Predicted Maximum Oxygen Consumption at Three Selected Times of Day—J. Hornak and P. Ewbank, Central Michigan University, Mount Pleasant
19. Fluid Balance in Men and Women During a 40 KM Run in the Heat—M. Millard-Stafford; P. Sparling and L. Rosskopf, Georgia Institute of Technology, Atlanta
20. Predicting the Performance of Female College Volleyball Players—Chris Hartman; Kathleen Knutzen and Lorraine Brilla, Western Washington University, Bellingham
21. Validity of the Caltrac for Use in Monitoring Upper and Lower Extremity Movement—Joe Smith; Dorrie Bucholtz; Wojtek Chodzko-Zajko and Phillip Bishop, The University of Alabama, Tuscaloosa
22. Comparison of Methods for Determination of Maximum Sustainable Aerobic Power—Glenn Gaesser, University of Virginia, Charlottesville
23. The Effects of Various Levels of Activity on Regional and Total Body Bone Mineral Densities—Eva Lee; Kelly Long; Hally Poindexter and Cynthia Willis, Rice University, Houston, Texas and William Risser, University of Texas Medical School, Houston
24. The Effect of Physical Fitness on Bone Mineral Density—Hally Poindexter; Kelly Long and Eva Lee, Rice University, Houston, Texas and William Risser, University of Texas Medical School, Houston
25. The Effects of Competitive Swimming on Bone Mineral Density—Kelly Long; Eva Lee and Hally Poindexter, Rice University and William Risser, University of Texas Medical School, Houston
26. The Effects of Weight Training, Running, and Combined Weight Training and Running on the Structure and Function of the Heart—

Barbara Elias; Kris Berg and Richard Latin, University of Nebraska, Omaha, Morris Mellion and Philip Hofschire, University of Nebraska Medical Center, Omaha

27. Comparison of Optical Density and Skinfold Measurements for Assessing Subcutaneous Fat—V. Hicks; V. Heyward; K. Jenkins; B. Colville; K. Cook; J. Quatrochi and W. Wilson, University of New Mexico, Albuquerque
28. Validity of a Near-Infrared Spectrophotometry Device (Fultrex-5000) for Estimating Body Composition of Adult Males and Females—T. Crews; R. Farley and R. Cobb, Western Kentucky University, Bowling Green
29. Effects of Food Ingestion and Exercise on Body Composition Measurements—Chester Zelasko, SUNY College at Buffalo and William Heusner, Michigan State University, East Lansing
30. Bioelectric Impedance VS Underwater Weighing in Black Women—P. Sparling; M. Millard-Stafford; L. Rosskopf; L. DiCarlo and B. Hinson, Georgia Institute of Technology, Atlanta
31. The Effect on the Analysis of Grouping Data by Somatotype Component or by Somatotype Dominance—William Bolonchuk, USDA-ARS Grand Forks Human Nutrition Research Center and the University of North Dakota, Henry Lukaski and William Siders, USDA-ARS Grand Forks Human Nutrition Research Center, North Dakota
32. Muscular Power of the Arms in High School Wrestlers—T. Housh; J. Eckerson; S. Evans; G. Johnson and J. Weir, University of Nebraska, Lincoln
33. Prediction of VO_2 Max in Boys, Ages 11 to 14 Years—Loren Erdmann; Larry Hensley and Forrest Dolgener, University of Northern Iowa, Cedar Falls
34. Relationship of Absolute Strength and Relative Endurance in Females—Robert Johnson; Michael Stone; Cannon Cameron and Valerie Midgett, Appalachian State University, Boone, North Carolina
35. Low Back/Trunk Flexibility in Young Children—Cheryl Norton and Mark Harvey, Metropolitan State College, Denver, Colorado, Betty Versteeg, Denver Public Schools and Carol Borman, Metropolitan State College, Denver, Colorado
36. Is Vo_2 Max an Appropriate Criterion for Assessing One-Mile Run/Walk Time in Children Aged 6 to 13 Years?—C. Ebbeling; E. Puleo; A. Ward; S. Damitz; E. Peterson and J. Rippe, University of Massachusetts Medical Center

BEST COPY AVAILABLE

RESEARCH CONSORTIUM: INVITED LECTURE

2:00 - 3:15 p.m. - Convention Center, Rooms 250 & 262

PRESIDER: James Bryant, California State University, San Jose

Gender Ideology and Sport Socialization, Susan Greendorfer, University of Illinois

RESEARCH CONSORTIUM FREE PAPERS: HEALTH BEHAVIORS/HEALTH PROMOTION

2:00 - 3:15 p.m. - Convention Center, Rooms 270 & 272
PRESIDER: David Macrina, University of Alabama, Birmingham

2:00-2:15 p.m.—	Education to Improve the Impact of Cholesterol Screening on Young Adults—John Scheer; Richard Schmidt and Steven Wise, University of Nebraska, Lincoln
2:15-2:30 p.m.—	The Results of Mandatory Compliance to an Exercise and Weight Loss Program Among High Risk Southwestern Theological Seminary Students—Fred Fridinger and Pamela Moorhead, University of North Texas, Denton
2:30-2:45 p.m.—	The Effect of a Clinically Based CHD Risk Intervention on Diet and Exercise Adherence and Consequent Plasma Cholesterol Profile—L. Taylor; S. Fuller; A. Knehans; R. Ratliff and T. Coniglione, University of Oklahoma, Norman
2:45-3:00 p.m.—	An Analysis of Newsletter Features Perceived as Valuable by Worksite Health Promotion Decision-Makers—Richard Miller and Thomas Golaszeski, George Mason University, Fairfax, Virginia
3:00-3:15 p.m.—	Participation and Trends in Vigorous Physical Activity of an Adult Population—Steven Aldana and William Stone, Arizona State University, Tempe

SATURDAY, APRIL 6, 1991

RESEARCH CONSORTIUM SYMPOSIUM: DRUG FREE SCHOOLS-RESEARCH THEORY INTO PRACTICE

9:00 - 10:15 a.m., Convention Center, Rooms 250 & 262

ORGANIZER: Peter Mulhall, University of Illinois, Champaign-Urbana
SPEAKERS:

State-wide Dissemination of Alcohol and Other Drug Prevention Curriculum—H. Richard Travis; Stephen Stewart; Terry Wessel; Donna Videto and Herb Amato, James Madison University, Harrisonburg, Virginia

Analysis of a Comprehensive School, Family and Community Prevention Program—Donald Stone; Peter Mulhall; William Creswell and Lawrence O'Reilly, University of Illinois, Champaign-Urbana, Ann Nolte and Bette Keyser, Illinois State University, Normal

Evaluating the Implementation of Teacher Training in a Drug Free Schools Program—David Macrina; G. Greg Wojtowicz and Charlotte Hendricks, The University of Alabama, Birmingham

Impact of Keeping a Clear Mind Parent/Child Drug Prevention Program—Michael Young, University of Arkansas, Fayetteville, Chedley Werch, University of North Florida, Jacksonville, Carolyn Kerston and Anna Terentine, University of Arkansas, Fayetteville

RESEARCH CONSORTIUM SYMPOSIUM: CONSIDERATIONS FOR MONITORING CHOLESTEROL

9:00 - 10:15 a.m., Convention Center, Rooms 270 & 272

ORGANIZER: Leonard Kaminsky, Ball State University, Muncie, Indiana
SPEAKERS:

Validity and Precision of Cholesterol Measurements—Leonard Kaminsky, Ball State University, Muncie, Indiana

What You Need to Know about Aerobic Exercise and Cholesterol—Mitchell Whaley, Ball State University, Muncie, Indiana

On-Site Screenings for Cholesterol—Wes Alles, Stanford University, Stanford, California

BEST COPY AVAILABLE

RESEARCH CONSORTIUM POSTER SESSION: MOTOR BEHAVIOR/BIOMECHANICS

9:00 - 10:15 a.m.
PRESIDER: Mark Fischman, Auburn University, Auburn, Alabama

1. A Comparison of a Traditional Instruction Program and Neuromuscular Programming in the Motor Skill Proficiency Acquisition of a Closed Manipulative Skill—W. Harvey Poole, III, University of Southern Mississippi, Hattiesburg
2. Visual Pretraining Effects on Coincident Timing Skill Acquisition and Retention—Tracy Pellett, Ball State University, Muncie, Indiana
3. Programming Time as a Function of Directional Accuracy Demand—Ben Sidaway, Louisiana State University, Baton Rouge
4. The Effects of Contextual Interference and Environmental Context on the Learning of Motor Skills: A Developmental Perspective (Experimental Phase I)—Gail Polkis, Canisius College, Buffalo, New York and Jere Gallagher, University of Pittsburgh, Pennsylvania
5. Sensorimotor Integration of Simple and Choice Reaction Task Using the Psychological Refractory Period (PRP) Paradigm—M. Schutten; J. Romack; J. Burke and H. Morris, Indiana University, Bloomington
6. A Test of the Compatibility of Contextual Interference and Variability of Practice in Motor Learning—Kellie Hall, California Polytechnic State University, San Luis Obispo and Richard Magill, Louisiana State University, Baton Rouge
7. A Visual Pretraining Approach to Observational Learning: Effects of Coincident-Timing Skill Acquisition—Douglas Weeks, Ball State University, Muncie, Indiana
8. Alternating Actual and Imagery Practice: Paradigm Considerations—S. Dee Ellis and Robert Kohl, Wayne State University, Detroit, Michigan
9. Influence of Compatibility and Movement Characteristics on Response Latencies: Support for Abstract Response Codes—Mark Guadagnoli and T. Gilmour Reeve, Auburn University, Alabama
10. Visual Feedback Inhibits Kinesthetic Learning in Aged Adults—Gary Kamen, Boston University, Massachusetts
11. Changes in Knowledge Structure with Expertise in Baseball—Sue McPherson; Gary McCoy and Mark Eby, University of Oklahoma, Norman
12. Developmental Differences in the Visual Perception of Kinematic Forms and the Scaling of Muscular Force—Michael Lacourse, California State University, Long Beach and Anne Larimer, California Polytechnic State University, San Luis Obispo
13. Motor Performance Differences Between Middle Eastern Kuwaiti and North American Children—M. Heston, University of Northern Iowa,

Cedar Falls, D. Gallahue and J. Wigglesworth, Indiana University, Bloomington, M. Haroun, University of Kuwait and E. Kamal, University of Ottawa, Canada

14. The Use of Labeling to Improve Movement Recall Involving Learning Disabled Children—Marybeth Miller, Western Washington University, Bellingham and Jere Gallagher, University of Pittsburgh, Pennsylvania
15. Knowledge Base and Sport Skill Performance—Wagner Campos and Jere Gallagher, University of Pittsburgh, Pennsylvania
16. Relationships Among Sociocultural/Experiential/Social/Psychological Factors and Motor Proficiency of Preschool Children—Barbara Mead and Patricia Beitel, University of Tennessee, Knoxville
17. The Physical Fitness and Growth Characteristics of Urban Children—Sarah Erbaugh, Wayne State University, Detroit, Michigan
18. Response Preparation and Older Adults—Dapeng Chen; James Cauraugh; James Graves; Michael Pollock and Scott Leggett, University of Florida, Gainesville
19. Stroboscopic Analysis of the Axis of Rotation in the Tennis Serves—Rafael Bahamonde, Ball State University, Muncie, Indiana
20. Prediction of Optimal Plyometric Depth Jump Height Utilizing Strength and Physical Characteristics—Kevin Quinn and Kathleen Knutzen, Western Washington University, Bellingham
21. A Comparison of the Adducted Versus Parallel Foot Stance on the Enhancement of Power in Junior High School Football Players—Mark Maneval; Ted Phillips and Helen Ptak, University of Southern Mississippi, Hattiesburg and George White, Clemson University, Clemson, South Carolina
22. A Ground Reaction Force Model to Assess Mechanical and Neuromuscular Response Components to Added Load During Drop Landings—Brian Caster and Barry Bates, University of Oregon, Eugene
23. Foot Strike Mechanics in Older Sprinters—Nancy Hamilton, University of Northern Iowa, Cedar Falls
24. Kinematic and Temporal Effects of Fatigue in the Concentric Phase of the Squat Exercise—S. Evans; J. Weir and L. Wagner, University of Nebraska, Lincoln
25. Spontaneous Fractures of the Humerus During Pitching—C. Partin; T. Branch; E. Emeterio; M. Sabatelle and P. Chamberland, Emory University, Atlanta
26. A Kinetic and Kinematic Comparison of the Traditional and Sumo Style Deadlifts—K. Renee Thiebaud, Texas Woman's University, L. Kay Thigpen, University of Nebraska, Omaha and Sharon Tramonte, University of Texas, M.D. Anderson Cancer Center, Houston

BEST COPY AVAILABLE

27. Comparison of the Energy Cost and Lower Extremity Mechanics of Three Stair-Stepping Machines—C. Ebbeling; T. Foti; J. Hamill; A. Ward and J. Rippe, University of Massachusetts, Amherst

28. Correlation of Wheelchair Racer's Anthropometric, Chair, and Interface Dimensions—Michael MacLeish; Rory Cooper and Fred Baldini, California State University, Sacramento

29. Step Length Differences Between Overground and Treadmill Walking in Below-Knee Amputees—Pamela Macfarlane, Northern Illinois University, DeKalb and David Nielsen, The University of Iowa, Iowa City

30. The Relationship of Pronation and Q-Angle in the Dynamic Setting—Robert Moss, Western Michigan University, Kalamazoo

RESEARCH CONSORTIUM SYMPOSIUM: RESEARCH ISSUES RELATED TO DRUG USE AND LEISURE INVOLVEMENT

10:45 a.m., Convention Center, Rooms 250 & 262

ORGANIZER: Ann Rancourt, State University of New York, Brockport
SPEAKERS:

Correlations Between Heavy Use of Alcohol and Illicit Drugs and Social Leisure Involvement—L. Burton, University of Alberta, Edmonton, Canada

Analyzing Leisure Involvement and Alcohol Use of Early Adolescents—Kathy Sheltens, University of Illinois, Champaign, Urbana

Results of a Post-Discharge Survey of Women Who Participated in a Six Month Leisure Education Program While in Substance Abuse Treatment—Ann Rancourt, State University of New York, Brockport

RESEARCH CONSORTIUM FREE PAPERS: EXERCISE PHYSIOLOGY

10:45 - Noon - Convention Center, Rooms 270 & 272
PRESIDER: Mindy Millard-Stafford, Georgia Institute of Technology, Atlanta

10:45-11:00 a.m.— Effect of Aerobic Exercise Training on Choice Reaction Time in Elderly Men and Women—James Graves; James Cauraugh; Michael Pollock; Dapeng Chen; Scott Leggett and Diane Spitler, University of Florida, Gainesville

11:00-11:15 a.m.— Estimating VO_2 Max From Heart Rate and Running Speed—N. Sherman; A. Jackson and J. Pivarnik, University of Houston, Texas

11:15-11:30 a.m.— The Lactate Threshold as a Critical Training Intensity—A. Weltman; R. Seip; D. Snead; J. Weltman; W. Evans; J. Veldhuis and A. Rogol, University of Virginia, Charlottesville

11:30-11:45 a.m.— Validity of A Self-Report Instrument for Measuring Physical Activity in Third Grade Students—Melinda Sheffield and James Morrow, Jr., University of Houston, Bruce Simons-Morton, SPH, UTHSC-Houston, James Pivarnik, University of Houston, Texas

11:45-12:00 noon— The Economy of Synchronous (SYN) and Asynchronous (ASYN) Wheelchair Propulsion—Fred Baldini; Rory Cooper and James Skinner, California State University, Sacramento

RESEARCH CONSORTIUM POSTER SESSION: ACTIVITIES FOR SPECIAL POPULATIONS/MEASUREMENT

10:45 - Noon
PRESIDER: David Poretta, Ohio State University, Columbus

1. Analysis of Physical Fitness Levels of Individuals with Mentally Handicapped Conditions in Illinois, 1980-1990—Peter Wang, Illinois State University, Normal
2. Development and Evaluation of a Systematic Run/Walk Program for Men with Mental Retardation—Barry Lavay, California State University, Long Beach and Thomas McKenzie, San Diego State University
3. Physical Education for the Pre-School Disabled Child: A Classroom Teacher's or a Specialist's Job?—Robert Hautala, University of Nebraska, Omaha
4. Self-Paced Aerobic Exercise—Pamela Cress, David Ellis, and Charles Spellman, University of Kansas Bureau of Child Research, Parsons
5. Effects of Individually Designed Circuit Weight Training Programs on Body Composition and Neuromuscular Performance of Elderly Men and Women—Frank Powell, Furman University, Greenville, South Carolina, Michael Hawkins, Greenville Athletic Club and Sharon Fletcher, Furman University, Greenville, South Carolina
6. Effects of Midline Crossing on Response Components of Moderately Mentally Handicapped Adults—Julie Johnston, Paul Surburg, Indiana University, Bloomington and B. Eason, University of New Orleans, Louisiana
7. The Effect of Strength Training the Lower Extremities in Women with Rheumatoid Arthritis—Catherine Kennedy, Colorado State Uni-

BEST COPY AVAILABLE

versity, Fort Collins and Cynthia Wiese, West Chester State College, West Chester, Pennsylvania

8. Comparison of Blood Lipid Levels in a Down Syndrome Versus Non-Down Syndrome Mentally Retarded Population—James Rimmer, Northern Illinois University, DeKalb, Dave Braddock and Glen Fujiura, University of Illinois, Chicago
9. Including Parents in a School-Based Exercise and Nutrition Program for Learning Disabled Children—Chris Hopper; Mary Gruber; Kathy Munoz and Susan MacConnie, Humboldt State University, Arcata, California
10. The Influence of Strength Training on Muscular Strength and Kinesthesis in Children of Varying Visual Abilities—J. Ozmun, Portland State University, Oregon, A. Mikesky, The National Institute for Fitness and Sport, Indianapolis, and Paul Surburg, Indiana University, Bloomington,
11. Expertise and Teaching Effectiveness with Mainstreamed and Non-Mainstreamed Children—Bill Vogler; Hans van der Mars; Paul Darst, Arizona State University, Tempe and Barbara Cusimano, Oregon State University, Corvallis
12. Motor Sequencing of Learning Disabled Boys: Modeling and Verbal Rehearsal Strategies—Ellen Kowalski, Adelphi University, Garden City, New York
13. Do As We Say Not As We Do—Walter Davis, Kent State University, Kent, Ohio and Terry Rizzo, California State University, San Bernardino
14. Effect of Duration of Blindness on Selected Aspects of Fitness Among Women—Jeanne Wenos, Western Washington University, Bellingham and David Wenos, James Madison University, Harrisonburg, Virginia
15. The Relationship and Reliability of Isokinetic and Isometric Measures in Mentally Retarded Men—Rory Suomi; Paul Surburg; Peter Lecius and Wendy Poppy, Indiana University, Bloomington
16. Physiological, Anthropometric and Dietary Profiles of Obese Children Participating in a 16-Week Nutrition Education and Physical Activity Program—Lynn Darby; Jack Thomas and Younghee Kim, Bowling Green State University, Bowling Green, Ohio and Roberta Pohlman, Wright State University, Dayton, Ohio
17. An Assessment of a Stress Challenge Program for Adjudicated Juveniles—Dale DeVoe, Colorado State University, Fort Collins
18. Movement Patterns Used by Children with Cerebral Palsy While Rising From Supine to Standing—Boni Boswell, East Carolina University, Greenville and Nancy Gryder, New Bern, North Carolina
19. Interrater Reliability of Research Quarterly for Exercise and Sport Reviews—James Morrow, Jr.; Janet Fulton and Molly Broskoski, University of Houston, Texas and Jerry R. Thomas, Arizona State University, Tempe

20. Predicting Maximum Strength With Absolute Endurance, Weight and Gender—A. Jackson and D. Wilson, University of North Texas, Denton

21. Relationships Among Various Objective Swimming Tests and Two Expert Evaluations of Skill in Swimming—Hilda Fronske, Utah State University, Logan

22. Performance Characteristics of Elite Male Volleyball Players—James Disch, Rice University, Houston, Texas and James Coleman, U.S.A. Mens' Volleyball Team

RESEARCH CONSORTIUM: INVITED LECTURE

2:00 - 3:15 p.m. Convention Center, Rooms 250 & 262

PRESIDER: William Whitehill, University of Alabama, Tuscaloosa

Performance Enhancing Drugs, Mel Williams, Old Dominion University, Norfolk, Virginia

RESEARCH CONSORTIUM FREE PAPERS: MOTOR LEARNING

2:00 - 3:15 p.m. - Convention Center, Rooms 270 & 272
PRESIDER: James Cauraugh, University of Florida, Gainesville

2:00-2:15 p.m.—	Is the "Summary-KR" Effect a Relative Frequency of KR or Spacing Effect?—C. Gable; C. Shea and D. Wright, Texas A&M Univerisity, College Station
2:15-2:30 p.m.—	The Development of Contextual Dependencies During Motor Skill Acquisition: Further Evidence—D. Wright and C. Shea, Texas A&M University, College Station
2:30-2:45 p.m.—	Acquisitions of Hierarchical Control as a Function of Observational Practice—Robert Kohl, Wayne State University, Detroit, Michigan and Charles Shea, Texas A&M University, College Station
2:45-3:00 p.m.—	Post-KR Delay Activities that Degrade Skill Learning—David Anderson; Douglas Young and William Husak, California State University, Long Beach and Michael Cohen, Department of Veterans Affairs Medical Center, Long Beach
3:00-3:15 p.m.—	Specificity of Practice in the Acquisition of Response Selection Skill—T. Gilmour Reeve; Mark Guadagnoli and Kenneth Steele, Auburn University, Auburn, Alabama

BEST COPY AVAILABLE

RESEARCH CONSORTIUM POSTER SESSION: LEISURE/DANCE/POTPOURRI

2:00 - 3:15 p.m.
PRESIDER: Jolynn Kuhlman, Indiana State University, Terre Haute

1. Women and the Meaning of Physical Recreation—Karla Henderson and M. Deborah Bialeschki, University of North Carolina, Chapel Hill
2. Scenic Roadways as a Means to Resource Preservation—Steven Simpson, Robert Robertson, and Mary Robertson, Iowa State University, Ames
3. Symptom Reporting, Perceived Health & Leisure Behavior—Michael Kanters and William Montelpare, Brock University, St. Catharines, Ontario, Canada
4. A Program Satisfaction Instrument—Sandra Hupp, Washington State University, Pullman
5. Physical Activity Preferences Among Active Adults—William Stone and Steven Aldana, Arizona State University, Tempe
6. A Practical Investigation of Volunteer Systems in Rural Communities—Ralph Nilson, University of Regina, Regina, Saskatchewan, Canada
7. Perceived Freedom in Leisure of People with Arthritis—Carlton Yoshioka and Shelley Smith, Arizona State University, Tempe
8. The Role of Gender and Sensation-Seeking in Recreation Activity Preference—Randy Virden and Doug VanOmmeran, Arizona State University, Tempe
9. Thought Patterns of Beginning and Experienced Dancers During Ballet Instruction—Terry Worthy and Jo Alice Carter, Louisiana State University, Baton Rouge
10. Attributional Orientations of Low and High Self-Esteem Collegiate Jazz Dancers Following Success and Failure Situations—E. Rinehart; D. Walker and K. Nelson, University of Idaho, Moscow
11. Effects of a Nutrition Intervention on Female Endurance Athletes with Regard to Classification of Menstrual Status—Dessa Bergen-Cico, Syracuse University, New York
12. An Assessment of Basic Knowledge Held by American High School Seniors Regarding Health, Fitness, and Sports—William Edwards, California State University, Sacramento and Steve Spencer, Western Kentucky University
13. Effects of a Competency-Based Instructional Program on First-Grade Children's Gross Motor Development—Arlene Ignico, Ball State University, Muncie, Indiana
14. Interactive Thought Processes as Influenced by Teacher Role Identity—Jo Carter; Terry Worthy; Amelia Lee and Melinda Solmon, Louisiana State University, Baton Rouge

15. Assessment of Pre-School Children's Playground Skills: Focus on Behavioral Manifestations of Movement Confidence—Michael Crawford, University of Missouri, Columbia and Norma Griffin, University of Nebraska, Lincoln
16. Perceived Competence and Motivational Goals: Children's Task Choice, Performance and Strategy Use Under Perceived Success and Failure Conditions—Diana Shakarian, California State University, Fullerton
17. An Evaluation of Posture Training Techniques Using Objective and Subjective Measures to Assess the Sagittal Curvatures—Malcolm Fairweather, Louisiana State University, Baton Rouge
18. The Status of Psychological Test Development in the Sport and Exercise Sciences From 1965-1989—Andrew Ostrow, West Virginia University, Morgantown
19. Relationship Between Program Goals, Leadership Philosophy, and Occupational Stress Among Intercollegiate Athletic Administrators—Todd Ryska, University of Southern California, Los Angeles
20. Female Coaches in the State of Illinois: A Status Report—Paula Schneider, Churchville Junior High School, Illinois and Susan Wilkinson, University of Illinois, Chicago
21. A Description of Teacher Accountability in Physical Education—Jacalyn Lund, University of Louisville, Kentucky
22. The Female Intercollegiate Athlete: Perceived Impact of Gynecologic Disorders—Carol Wilson, University of Virginia, Charlottesville
23. Relationships Between Static Balance Performance and Vestibular System Functioning in Young Children—Sherry Folsom-Meek, Diana Baldwin, Michelle Chouteau, University of Missouri, Columbia

RESEARCH CONSORTIUM SYMPOSIUM: RESEARCH AND METHODOLOGICAL ISSUES IN THE STUDY OF DRUG USE AND ABUSE

3:45 - 5:30 p.m., Convention Center, Rooms 250 & 262

ORGANIZER: Donald Stone, University of Illinois, Champaign-Urbana
SPEAKERS:

Using Multidimensional Scaling Analysis to Measure College Students' Attitudes Toward Alcohol—Elizabeth Edmundson, The University of Texas Health Science Center, Austin

Drug Attitude Scale Construction: Methodology and Practical Application—Mohammad Torabi, Indiana University, Bloomington

BEST COPY AVAILABLE

Intentions to Use Drugs: A Methodological Paradox for Evaluating Drug Abuse Preventive Programs—Peter Mulhal; Donald Stone and William Creswell, University of Illinois, Champaign-Urbana

A Factor Analysis of Drug Use Patterns Among High School Students—Molly Laflin; David Weis and Richard Zeller, Bowling Green University, Ohio

RESEARCH CONSORTIUM FREE PAPERS: PEDAGOGY

3:45 - 5:30 p.m. - Convention Center, Rooms 270 & 272
PRESIDER: Patt Dodds, University of Massachusetts, Amherst

3:45-4:00 p.m.—	Perceptions of Reality in Student Teaching: A Qualitative Analysis—Lynda Randall, California State University, Fullerton and Jeanette Askins, Florida State University, Tallahassee
4:00-4:15 p.m.—	The Role of False Dichotomies in the Development of Novice Teachers' Curricular Knowledge—Inez Rovegno, University of Illinois, Champaign-Urbana
4:15-4:30 p.m.—	The Effect of Modeling and Verbal Rehearsal on the Motor Skill Performance of Hispanic ESL Children—Karen Meaney and Rosaland Edwards, University of Houston, Texas
4:30-4:45 p.m.—	The Effects of Playing and Teaching Experience on Ability to Identify Critical Features of the Tennis Serve—Gail DiCicco, University of Pittsburgh, Pennsylvania
4:45-5:00 p.m.—	High School Students as Prospective Physical Educators: Revival of the Subjective Warrant—Gayle Hutchinson, California State University, Chico and Patt Dodds, University of Massachusetts, Amherst
5:00-5:15 p.m.—	Effects of Component-Specific Interventions on Overhand Throwing Performance of Preschool Children—Judith Oslin, The University of Alabama, Tuscaloosa

SUNDAY, APRIL 7, 1991

RESEARCH CONSORTIUM FREE PAPERS: BIOMECHANICS

9:00 - 10:15 a.m. - Convention Center, Room 250 & 262
PRESIDER: Jerry Wilkerson, Texas Woman's University, Denton

9:00-9:15 a.m.—	Temporal Structure of a Three-Dimensional Soccer Instep Kick—Cynthia Tant, Iowa State University, Ames and Jerry Wilkerson, Texas Woman's University, Denton
9:15-9:30 a.m.—	A Comparison of Techniques used for Blocking and Control of the Somersault in the Handspring and Salto Forward Tucked Vault at the 1986 USA Championships and 1988 Olympic Games—Yoshiaki Takei, Northern Illinois University, DeKalb
9:30-9:45 a.m.—	Mass-Velocity Effects on Enhancement of the Concentric Phase During Drop Jumping—Rick Robertson, California State University, Sacramento and Rush Green, University of Oregon, Eugene
9:45-10:00 a.m.—	Dynamic Strength and Perceived Exertion Among Active and Sedentary Women Throughout the Menstrual Cycle—Ro Di Brezzo; Inaz Fort; Melinda Boorman and Burch Oglesby, University of Arkansas, Fayetteville
10:00-10:15 a.m.—	A Comparison of Massage and Acupressure Treatments on Muscle Relaxation—Fang Chen and Barry Bates, University of Oregon, Eugene

RESEARCH CONSORTIUM FREE PAPERS: PSYCHOLOGY

9:00 - 10:15 a.m. - Convention Center, Rooms 270 & 272
PRESIDER: Vicki Ebbeck, Oregon State University, Corvalis

9:00-9:15 a.m.—	Multidimensional Trait Anxiety as a Predictor of Multidimensional State Anxiety—Vikki Krane, Bowling Green State University, Bowling Green, Ohio and Laura Finch, University of North Carolina, Greensboro
9:15-9:30 a.m.—	Modeling the Influence of Social Support and Efficacy Cognitions in the Exercise Behavior of Sedentary Adults: A Structural Equation Analysis—Terry Duncan, Oregon Social Learning Center, Eugene
9:30-9:45 a.m.—	Perceived Coaching Strengths and Weaknesses of Novice Woman Coaches—Heather Barber; Maureen Weiss and Becky Sisley, University of Oregon, Eugene Ebbeck and Vicki Ebbeck, Oregon State University, Corvallis

BEST COPY AVAILABLE

9:45-10:00 a.m.—	Relationship of Selected Variables in the Assessment of Participant Leadership Qualities—Mary Engelman and Dale Pease, University of Houston, Texas
10:00-10:15 a.m.—	Psychological Momentum and Skill Performance-A Laboratory Study—John Silva, Allen Cornelius and Laura Finch, University of North Carolina, Chapel Hill

RESEARCH CONSORTIUM FREE PAPERS: HEALTH

10:45 - Noon - Convention Center, Rooms 250 & 262
PRESIDER: Gene Fitzhugh, University of Alabama, Tuscaloosa

10:45-11:00 a.m.—	Self-Esteem and Attitudes, Perceptions, Behavior and Expected Behavior, Relative to Drug Use Among Fifth and Sixth Graders—Michael Young; Susan Rausch and Ken Shriner, University of Arkansas, Fayetteville
11:00-11:15 a.m.—	Using the Theory of Reasoned Action to Predict Participatory and Non-Participatory Breast Self-Examination in Senior College Women—Emogene Fox and Jane Lammers, University of Central Arkansas, Conway
11:15-11:30 a.m.—	Use of Factor Analytic Techniques in Health Research: A Meta Analysis—Catherine Teare Ketter, Georgia College, Milledgeville and James Eddy, University of Alabama, Tuscaloosa
11:30-11:45 a.m.—	The Relationship Between Fitness Assessment Results and Exercise Adherence in a Corporate Health and Fitness Program—Bradley Wilson and Donald Wagner, University of Cincinnati, Ohio
11:45-12:00 noon—	Personal Problem-Solving Inventory (PPSI): Application and Evaluation of Gender Differences in Adolescents—Marianne Frauenknecht, Western Michigan University, Kalamazoo and David Black, Purdue University, West Lafayette, Indiana

CONSORTIUM FREE PAPERS: DANCE

10:45 - Noon - Convention Center, Rooms 270 & 272
PRESIDER: Judith Gray, San Mateo, California

10:45-11:00 a.m.—	The Relationship Between the Electrical Activity of the Lower Leg Muscles and Foot Impulse Patterns in a Balletic Vertical Jump. Jennifer Stacey and Rick Robertson, University of Oregon, Eugene
11:00-11:15 a.m.—	An Investigation of the Nutritional and Physiological Status and Characteristics of Eating Disorders of Female Ballet Dancers and Distance Runners—DawnElla Braley-Rust, Emporia State University, Emporia, Kansas
11:15-11:30 a.m.—	Physical Fitness, Body Image, and Locus of Control in College Women Dancers and Non-Dancers—Sally Radell; Daniel Adame; Steven Cole and Thomas Johnson, Emory University, Atlanta and Maher Abbas, Stanford University, Stanford, California
11:30-11:45 a.m.—	Dietary Practices and Radial Bone Density of College Dancers—K. Garbe, Youngstown State University, Youngstown, Ohio, C. Sanborn and N. DiMarco, Texas Woman's University, Denton and M. Samuels, UTHSC, San Antonio, Texas
11:45-12:00 noon—	The Effects of Participation in Modern Dance on French Children's Attitudes Measured by Domain Discrimination—Nelson Neal, Longwood College, Farmville, Virginia and Jeanne Marie Dineur, Institution Saint-Michele, Solesmes, France

RESEARCH CONSORTIUM FREE PAPERS: FITNESS

1:00 - 2:15 p.m. - Convention Center, Rooms 250 & 262
PRESIDER: Fred Baldini, California State University, Sacremento

1:00-1:15 p.m.—	Health-Related Fitness in First Through Fourth Grade Students—David Thomas, Rice University, Houston, Texas
1:15-1:30 p.m.—	The Percent of Maximal Aerobic Capacity Utilized by 9-10 Year-Old Boys During the One-Mile Run/Walk—Deborah Thompson; William Vincent; Steven Loy; Deborah Mutton; George Holland and Stephen Shaw, California State University, Northridge
1:30-1:45 p.m.—	The Effects of Mandatory Exercise Training on Physical Fitness and Ischemic Heart Disease Risk Factors of Fire Fighters - A Longitudinal Study—John Green and Stephen Crouse, Texas A&M University, College Station

BEST COPY AVAILABLE

1:45-2:00 p.m.— The Relationship Between Former Collegiate Varsity Sports Participation and Osteoarthritis—Ronnie Carda, Emporia State University, Emporia, Kansas, Henry Montoye, University of Wisconsin, Madison, and Homer Sprague, Michigan State University, East Lansing

2:00-2:15 p.m.— Effects of High and Low Intensity Exercise on Residual Volume and Body Composition in Previously Sedentary Men—Nicolaas Pronk; Robert Lowe and Stephen Crouse, Texas A&M University, College Station

SYMPOSIUM: PAST, PRESENT, AND FUTURE MOTOR CONTROL AND EXPERIMENTAL DESIGN CONSIDERATIONS INFLUENCING CHANGES IN MOTOR PROCESSING DURING RAPID VOLUNTARY HUMAN MOVEMENT

Over the past decade, we have furthered our understanding of the neuromotor mechanisms involved in the control of rapid voluntary human movement through the use of electromyography (EMG), and the fractionated reaction time (RT) experimental paridigm. This has led to an interesting finding in the motor control literature: changes in motor processing during rapid voluntary movement even under experimental conditions which did not stress the peripheral musculature. The main objective of this symposium is to discuss past, present, and future motor control and experimental design considerations influencing changes in motor processing during rapid voluntary human movement. This will be accomplished in the first section by reviewing fractionated RT findings demonstrating changes in motor processing during rapid movement initiation. The second section will discuss neuromuscular mechanisms underlying rapid movement initiation. The third section will discuss the influence of experimental design upon changes in motor processing during rapid movement initiation. Finally, directions for future research investigating changes in motor processing during rapid movement initiaiton will be presented.

A REVIEW OF FRACTIONATED REACTION TIME FINDINGS DEMONSTRATING CHANGES IN MOTOR PROCESSING DURING RAPID MOVEMENT INITIATION.

Pamela J. Hoyes Beehler, The University of Texas at Arlington, and Joy L. Hendrick, State University College at Cortland

Under conditions which do not stress the peripheral musculature, it is generally accepted that variation in RT is primarily due to factors which can affect central processing (premotor time--PMT), such as aging, motivation, foreperiod, movement extent, practice, and warning period, rather than factors which can affect motor processing (motor time--MT). Recent findings in the motor control literature (e.g., double stimulation, variations in stimulus intensity), however, have shown changes in motor processing, and will be reviewed in this section.

NEUROMUSCULAR MECHANISMS UNDERLYING RAPID MOVEMENT INITIATION: WHAT'S GOING ON IN THERE? Gary Kamen, Boston University.

Our studies of surface electromyographic activity during rapid movement initiation have allowed us to understand how the human motor system programs some of the gross features of motor coordination. We now know, for example, about the crucial role for the antagonist musculature in rapid movements. However, we know fairly little about how the nervous system optimizes the activation of individual motor units. This presentation will briefly review our knowledge of gross motor coordination mechanisms during rapid movement and present some new ideas regarding the role of motor unit synchronization, doublet firing, and other strategies to initiate rapid motor activity.

THE INFLUENCE OF EXPERIMENTAL DESIGN UPON CHANGES IN MOTOR PROCESSING DURING RAPID MOVEMENT INITIATION. Harold H. Morris, Indiana University.

The results of experiments that use the between-subjects design have been found to differ from those using a within-subjects design under certain circumstances. The effect of variation in the type of experimental design and its effect upon various parameters of motor processing will be considered. Additionally, an analysis of variance (ANOVA) procedure by Erlebacher (1977) which allows for the testing of the independent variable effect, the experimental design effect, and the important interaction between independent variable and experimental design will be examined.

DIRECTIONS OF FUTURE RESEARCH INVESTIGATING CHANGES IN MOTOR PROCESSING DURING RAPID MOVEMENT INITIATION.

David Koceja, Indiana University, and Jean Burke, University of South Carolina.

One technique that has been used to isolate motor processing changes in humans is the H-reflex. The H-reflex is elicited through submaximal electrical stimulation of the Ia afferent of the muscle spindle, which causes a brief muscle contraction without exciting the gamma motor neuron. Thus, the H-reflex provides an indirect but valid assessment of motor neuron excitability. Previous studies have elicited an H-reflex in either the foreperiod or the premotor time of a RT task to assess changes in spinal cord excitability preceeding a rapid voluntary movement. This research paradigm can be applied to fractionated RT studies to better understand neuromuscular mechanisms underlying changes in motor processing and will be discussed in this presentation.

"SPORTING EVENT OF THE YEAR;" THE HOWARD-LINCOLN FOOTBALL CLASSIC, 1919-1929

David K. Wiggins, George Mason University

Perhaps the most significant sporting rivalries among black colleges during the first half of the twentieth century were the annual Thanksgiving Day football games between such well-known institutions as Fisk and Tuskegee Institute, Hampton Institute and Morgan State, and Howard and Lincoln Universities. The intent of this study is to examine the annual Thanksgiving Day football game between Howard and Lincoln between 1919 and 1929. Utilizing such primary source materials as school yearbooks, black and white newspapers, alumni records, presidential papers, and faculty minutes, this study seeks to determine the meaning of the Howard and Lincoln football classic to members of the black community and how the game fit into the overall structure of black college sport. This study is significant in that it furnishes much needed insight into the role of football and pattern of sport in black colleges, topics which have been dealt with in only a cursory fashion by historians and scholars in sport studies. What is immediately apparent from this analysis is that the Howard and Lincoln football classic, in addition to determining athletic superiority on the gridiron, was an important social event which brought the black upper-crust together on an annual basis to share in the excitement of sport while at once reaffirming their special place in a society marked by steady northern migration and new sense of political activism in America's black community. The game also helped bring forth, however, evidence of self-organization, creativity, and expression among blacks in much of the northeastern part of the country. Along with other Thanksgiving Day rivalries, the Howard and Lincoln classic played a supportive role in the coalescence of northern black communities fraught with problems associated with the large influx of southern blacks. The game engendered, through identification with its teams and players, a sense of pride among blacks that often transcended school loyalties and social class differences. The game also served as an enjoyable cultural counterpoint to the often grim experiences of everyday life and as an autonomous event influenced by external forces but firmly embedded in a supportive black community.

THE INTEGRATION OF PROFESSIONAL BASKETBALL 1920-1950

John R. Schleppi, University of Dayton.

This study examined the integration patterns of professional basketball in the United States. Appropriate histories, articles, and commentaries about the professional game were reviewed for background material. The Black and White newspapers in selected cities participating in professional basketball during this time period (as Chicago, New York, Oshkosh and Sheboygan) were studied. Players, administrators and coaches were interviewed about their involvement and interpretation of the integration process. Standard historical investigative procedures (internal and external criticism and cross checking of findings) were employed. Significant findings included: (1) Black teams played white teams regularly from the early 1920's - even the first game of the black New York Renaissance in November, 1923 was against a white team. (2) The World Tournament of Professional Basketball held in Chicago in 1939 was the first competition where all-black and all-white teams competed equally for a major team professional championship. (3) Competition during World War II included a number of integrated teams in both the National Basketball League and the World Tournament. (4) During the late 1940's the established National Basketball League was integrated, while the newly formed Basketball Association of America was not integrated. (5) The merger of the two leagues in 1949 lead to limited integration in that year of the National Basketball Association followed by a gradual increase through the 1950's. Factors that influenced the integration of professional basketball in contrast to other professional team sports included: (1) Professional basketball was played primarily in northern cities of the United States. The game was not as vulnerable to southern segregationist ideas as were baseball and football. (2) The game struggled constantly to survive financially and players and owners were forced to play teams (black and white) with box office appeal for economic success. (3) As a result of these difficulties a feeling of comraderie and respect developed among many players of both races. (4) World War II itself forced the integration of factories. Black and white players, working together in industry, carried this onto the basketball court as many professional teams were sponsored by companies engaged in war production. (5) Economic pressure, as much as any altruism, paved the way for integration of the National Basketball Association in 1949. Thus, professional basketball pioneered the integration of professional team sports in the United States.

John R. Schleppi
Department of Physical Education
University of Dayton
Dayton, OH 45469

IDEALIZED MIDDLE CLASS SPORT IMPALED ON ITS OWN SWORD OF BOOSTERISM: ORGANIZED LACROSSE IN TWO TOWNS, 1871-1890. Nancy B. Bouchier, Kansas State University.

Nineteenth century small town celebrations held on civic holidays, like Dominion Day (Canada's birthday), say much about social relationships and values in a community. Similar to America's Fourth of July holiday, Dominion Day was rarely celebrated without some form of sporting competition. Of the three team sports that highlighted two small Ontario towns' civic booster-sponsored holiday celebrations,lacrosse bore the clearest version of the games-build-character approach to sport endemic in late nineteenth century amateurism. Middle class social reformers, religious leaders, and educators heartily endorsed organized amateur lacrosse as a means to cultivate nationalism, manliness, and respectability in male youth, and as a vehicle for keeping youth leisure in check. As structured, lacrosse emphasized competition as a character-building process: victory was a means to an end, not an end in itself. Players were to possess an educated strength, manifested in a speed and agility that was carefully circumscribed by moral action. Middle class sportsmen in Ingersoll and Woodstock, Ontario, first adopted organized lacrosse in 1871. They labelled lacrosse the quintessential Canadian sport; the logical choice to highlight Dominion Day celebrations. They further promoted lacrosse among youth through schools and Amateur Athletic Associations (AAAs). Lacrosse caught on like wildfire. With its tremendous popularity in the late 1870's and 1880's, and with the increasing associations between lacrosse teams and towns in the heady days of urban boosterism, however, the gap between the ideation of moral progress (the altruistic goal of muscular Christianity) and player and spectator behavior widened significantly. Town and AAA pressures for victory, and fan and player reactions to defeat, undermined reformers' efforts. Lacrosse's very popularity, regardless of whatever reform beliefs organizers held, tainted its early reform orientation. By the late 1880's, middle class idealism was impaled on its own sword of urban boosterism. Once seen as a panacea to cure urban ills, lacrosse itself became perceived a symptom of urban vice.

CONTROLLING BODIES: FACULTY, PHYSICIANS, AND STUDENT LIFE AT TURN-OF-THE CENTURY WOMEN'S COLLEGES.

Susan G. Zieff, U.C. Berkeley.

By the closing years of the 19th century, it became apparent to many of those following the progress of higher education that the "experiment" of women in college could be considered a success. Earlier claims of reproductive damage from intellectual work were disproved by the first classes of female students who graduated, as Bryn Mawr President James Rhoads remarked in 1889, "in their best state of health, with the exception of some temporary fatigue that soon passed away." Verbrugge (Able-Bodied Womanhood,1988), and several other historians have reported on the programs of health monitoring which had been established in response to these medical warnings. Physical measurements were taken and compared throughout the course of study, and corrective and maintenance exercises prescribed for each student depending on need and capability. Statistical surveys conducted by Alice Foster at Bryn Mawr and Delphine Hanna at Oberlin were among those which sought to provide evidence of strength and height increases, as well as in other measurements. Such benefits were believed to result from the structured physical program, instituted and supervised by the college's female physician. At institutions such as the Woman's College of Baltimore, faculty and high-level administrators were even more intimately involved in each students' life. Faculty meetings often provided the arena during which the effect of work-load on students' health was discussed. The conclusions reached in the 1889 case of Sadie Bittner at the Woman's College were not unusual; "it was unanimously decided, that she give up her math and 2 or 3 hours of work on account of overwork." Student health and its relationship to work-load were matters which administrators, faculty, and physicians debated and determined, with the female physician's role circumscribed by their decisions. At a turn of the century meeting of the Board of Control at the Woman's College, Dean Van Meter stated that Miss May Clark asked for sixteen hours of work next year, with two laboratory courses. The request was referred to Dr. Welsh with instruction to report on her health." The diminished interest in controlling students' lives as well as their bodies by the administration was evidenced by such appointments as that of Lilian Welsh as Medical Advisor in 1909, after she had been campus physician for 17 years. This investigation draws upon minutes of faculty and Board of Trustees meetings from several women's colleges, the personal papers of women physicians at these institutions, as well as discussions of women in higher education by the contemporaries of these physicians. A major finding of this study is the broad role which college administrators took in the private lives of female students.

THE PRODUCTION ERA MODEL AND AMERICAN SPORT 1890 - 1910.

Lawrence W. Fielding, Brenda G. Pitts, Lori K. Miller, University of Louisville.

The Production Era model influences our understanding of American sport. The Production Era Model states that between 1870 and 1930 American manufacturing could be described by five main features. 1) Firms focused attention on developing new production technologies and more efficient management techniques. 2) Firms produced limited product lines that reflected production requirements and ignored customer needs. 3) Demand exceeded supply. 4) There was little competition in each product market. 5) Products sold themselves and there was little need to develop marketing techniques. The Production Era Model suggests that manufacturers of sporting goods focused attention on production. They produced limited product lines and ignored customer needs. Sporting goods manufacturers paid little attention to marketing because sport products sold themselves and there was little competition in product markets. The Production Era Model suggests that the sporting goods industry had little influence on the spread of sport. Conversely, the popularity of sport made the growth of the sporting goods industry possible. The purpose of this study was to test the historical accuracy of the Production Era Model applied to the sporting goods industry. It was hypothesized that if sporting goods manufacturers used modern marketing techniques between 1890 and 1910 then the main features of the Production Era Model would be historically inaccurate. Fourteen marketing mix variables were chosen for study. Included were packaging, grading and standardization, segmentation, market analysis, product design, producer-owner distribution houses, producer owner retail stores, producer-operated direct sales to consumers, inventory analysis and management, increased contact with independent retailers and chain stores, vertical price maintenance, consumer credit, company sales forces, and advertising by producers on a national scale. Trade magazines and histories of sporting goods manufacturers were studied to discover if the above marketing mix variables were used. Data was gathered on over 650 manufacturers of sporting goods. The data revealed that over forty-five percent of the 650 sporting goods manufacturers made use of ten out of the fourteen variables. We conclude that the Production Era Model is not historically accurate when applied to the sporting goods industry. The marketing of sporting goods developed along with production techniques. The data further suggest that the sporting goods industry was involved in the spread of sport in America.

AN ANALYSIS OF USERS OF MASS COMMUNICATION-BASED WORKSITE HEALTH PROMOTION PROGRAM WRITTEN MATERIALS.

Thomas Golaszewski, The Center for Corporate Health, Inc. and Louis Yen, The Fitness Research Center.

Mass communication written materials have gained increasing acceptance as worksite health promotion program options. Although program components have been generally targeted for all types of employees, decision makers often question the utility of providing written materials to certain populations because they are presumed to have reading deficiences or limited interest in matters of health. Therefore, the purpose of this research was to define user-profiles of four basic health promotion program written materials: health risk appraisal (HRA) individual report booklet, medical reference text, monthly newsletter and topic-specific brochures (fitness, weight, stress, etc.). Data were collected from employees representing 10 work organizations using a psychometrically-tested, self-report questionnaire distributed at program conclusion. A total of 5,167 completed questionnaires were received out of 18,415 distributed (29.8 percent). User vs. non-user categories were defined for all written materials. Chi-square analyses were used to determine proportional differences between users and non-users by selected demographics, including age cohorts by decade, gender, race (white, non-white), education (high school, college, graduate school), job function (levels 1,2 and 3, laborer/clerical to administrator/professional) and household size. With use status as the dependent variable, logistic regression was used to address possible multicollinearity among independent variables and determine the overall predictable variance attributable to demographics. Chi-square results indicated distinctive demographic differences between various materials and likelihood of use. Lower job rated and less educated females demonstrated significantly higher proportions of use for the reference text, newsletter and brochures. However, the results of the logistic regression showed that, although some of the Chi-square relationships were maintained (in particular for the medical reference text), the amount of total predictable variance for use status was unremarkable (medical reference text, $r^2 = 0.048$; newsletter, $r^2 = 0.03$; HRA material, $r^2 = 0.012$; $p < .05$). In conclusion, the limited effect of demographics on use patterns suggests that mass communication written materials have widespread appeal across all employee groups. This finding supports the utility of providing mass communication written materials to most employee populations regardless of demographic profile. In particular, written materials may be most appropriate for groups (lower educated, lower job rated) that have been considered hard-to-reach with written materials or other traditional forms of program delivery, e.g., classroom or fitness center-based programs. In addition, the consistently greater use by females supports distribution of written materials to the home for spouses of mostly blue collar, male populations, to achieve the greatest program impact.

CANCER PREVENTION AWARENESS OF ECONOMICALLY DISADVANTAGED ADOLESCENTS. R. Scott Olds, Kent State University, Kent, Ohio

The economically disadvantaged experience proportionately higher cancer morbidity, mortality and survival rates than the rest of the population. Within this subset many of the lifestyle habits related to cancer etiology are developed and reinforced during adolescence. This study assessed economically disadvantaged adolescents' knowledge, attitudes, and practices related to cancer prevention and risk. A literature review revealed a scarcity of data regarding the knowledge, attitudes, and practices related to cancer prevention and risk of economically disadvantaged adolescents. Research concerning the behaviors associated with cancer risk is necessary so that effective cancer education programs can be developed, implemented and evaluated. The document "Fighting Cancer in America: Achieving the Year 2000 Goal" recommended that improved data are needed relative to cancer prevention awareness and risk reduction of this special subgroup. Data from the Ohio Department of Education were utilized to randomly select school districts in Northeast, Ohio with at least 10% of their enrollment qualifying for Aid to Dependent Children. A Cancer Prevention Awareness Instrument from the National Cancer Institute was modified for this sample and administered to a randomly selected group of economically disadvantaged adolescents ages 13-19 in school districts in Northeast, Ohio. A total of 1600 subjects participated. Data were anaylzed descriptively. Results indicated that 11.4% of subjects perceived cancer to be serious. Nearly half (47.8%) believed cancer was not lifestyle related. More than half of the subjects (55.5%) believed that everything causes cancer. Subjects (65%) did not identify consumption of more fruit, vegetables, and other high fiber foods as behaviors that help reduce cancer risks. Less than half (42.4%) reported they would follow a physician's advice on ways to reduce possible cancer risks. Subjects (46%) reported that T.V. and radio were ways to effectively deliver cancer risk reduction messages. Approximately 16% considered themselves current smokers. This subgroup of adolescents practice lifestyles which place them at increasing risk of developing cancer. These results have implications for the development of cancer control programs which are culturally sensitive and relevant.

HEALTH NEEDS ASSESSMENT OF KOREAN STUDENTS AT THE PENNSYLVANIA STATE UNIVERSITY. Eun-Jin Choi, Larry Olsen, Department of Health Education, Penn State University, University Park.

The purpose of this study was to assess the health needs of Korean students at Penn State during Spring, 1990, and to identify the difficulties that these students have in using university and community health care services. There are many Korean students on American campuses. These students have difficulties in cultural adaptation and in using health care services because of cultural health belief differences. To date there are no studies that deal with the health needs and concerns of Korean students studying in the United States. Questionnaires were mailed to a total of 223 Korean students at Penn State, who were listed in the Korean Family Directory. Ten days after the first mailing, reminder postcards were mailed to the study population. A total of 105 questionnaires were returned for a response rate of 47.1%. To examine the factors that influenced Korean students' use of university health services, a chi-square analysis was utilized. The students' use of the university health service was significantly related to the confidence in speaking English ($p=.01$), this and the understanding of English ($p<.05$), and their length of stay at Penn State ($P=.01$). Use of health care services other than the university health service was significantly related to use of the university health service ($p<.01$), but further research is need to fully explain this result. Korean students wanted more information about the university health service. This information should be provided to foreign students early in their academic lives, considering their difficulties in accessing services. Korean students' health problems included stress, colds, fatigue, and headaches. Homesickness, financial problems, and academic problems were also important difficulties the Korean students faced. The majority of the Korean students did not have health insurance. Further studies dealing with factors that influence international students' use of university and community health care services are clearly needed so that appropriate educational programs can be developed and implemented to assist these students adjust to the U.S. health care system.

COMMUNITY COMPETENCE IN DELIVERY OF HEALTH RELATED SERVICES AND IMPACT ON YEARS OF POTENTIAL LIFE LOST.

Evelyn A. Knight, Hans H. Johnson, Don Holbert, East Carolina University, Greenville, North Carolina.

Research on delivery of community services can point direction for the application of community organization and development strategies for health educators. This study looks at the implications of emphasizing macro-change strategies for achieving a well society by examining the impact of the array of preventive health, medical care, housing and nutrition services, and community competence in the delivery of these services, on health status in 33 rural counties of Eastern North Carolina. A survey of 1183 community agency directors (61% return rate) identified the availability of 104 types of community service in each county and measured indicators of community competence, including citizen participation in planning and implementation of agency programs, agency knowledge of available services, and agency use of and involvement in communication and referral networks. It was hypothesized that counties with more complete service coverage and greater community competence in the delivery of services would have lower rates of years of productive life lost (YPLL). Correlations between county rankings on community competence and service scores revealed a trend toward lower white YPLL (but not non-white YPLL) in highly competent counties, and higher white YPLL (but not non-white) in the least competent counties. Canonical correlations between the service and community competence variables as one set of variates, and white and non-white years of potential life lost (YPLL) as the second set of variates, revealed that the community competence variables with the greatest effect on white YPLL were knowledge of services and use of agency networks in planning. None of the community competence or service variables had an effect on non-white YPLL in this analysis. Although often emphasized by health planners, availability of services alone is apparently not sufficient to have an impact on rates of YPLL and, more importantly, improving service availability and community competence is not having an impact on the high rates of non-white YPLL in these rural counties. These results point to the importance of coordination of services in counties and pose a challenge to the community diagnosis and community development skills of health educators.

STABILITY IN USE OF ACTIVITY STRUCTURES IN HIGH SCHOOL HEALTH EDUCATION CLASSES.

David C. Wiley, Southwest Texas State University

The purpose of this study was to use quantitative methodology to assess the stability of classroom activity structures in high school health education classes. By definition of pedagogical research, activity structures are classified as sub-environments of the classroom. Examples of activity structures include teacher presentation of content, seatwork, and student presentations etc. Activity structures have been studied in other content areas to quantify teacher/student interactions. For this study, 15 separate activity structures were identified. Twenty high school health education teachers were observed on four separate occasions to determine their respective classroom activities. Intraclass correlations were used to estimate the reliability of observing the use or non-use of a particular activity structure within a particular teacher given one observation ($\rho 1$) and four observations ($\rho 4$). The significance test indicated the stability within teachers on each particular activity structure. Use of Seatwork ($\rho 4 = .74$) and Pairs/Group Seatwork ($\rho 4 = .81$) were significant at the $p<.01$ level indicating that the use of these activities was stable across the observed instructors. Use of Dead Time ($\rho 4 = .50$) was significant at the $p<.05$ level, also indicating a reliable estimate of stability. Although not significant at the $p<.05$ level, Teacher Presentation of Content ($\rho 4 = .45$) and Testing ($\rho 4 = .40$) were stable in their use and non-use among instructors. The lack of stable patterns among the remaining activity structures indicated wide variability in classroom activities in the observed classrooms. One key implication of this pilot study is that by examining the types of classroom activity patterns which teachers use, pedagogical research may begin to identify the common teaching practices used in health education settings. By identifying and describing these common practices, the "process-product" model can be developed to link "effective" teaching practices as they relate to selected outcome measures of student achievement. Use of such activity structures may then be associated with positive achievement by students in the cognitive, affective, and behavioral domains in health education instruction.

BEST COPY AVAILABLE

AGE DIFFERENCES AMONG COLLEGE STUDENTS RELATIVE TO SUBSTANCE USE.

Elizabeth W. Edmundson and Tony L. Haden, The University of Texas

A major institutional drug use survey was conducted at a large, southwestern U.S. university. The survey consisted of sections and sub-sections that covered: personal substance use, perceived substance use by other students, behaviors associated with substance use, motivations, consequences and attitudes concerning substance use, and demographics. With the exception of the demographic items, the survey consisted of Likert-type scales. The instrument had a total of 170 items. The 8 psychoactive substances of interest were: alcohol, marijuana, cocaine, amphetamines, barbiturates, tranquilizers, psychedelics and designer drugs. The reliability of the survey, less the attitude scales, was excellent (coefficient alpha = .96). The reliabilities of the attitude scales ranged from .76 to .84. The Drug Use Survey was administered via a direct mail to a simple random sample of 2200 students. The net number of responses was 1013 or 46.04%. The purpose of this study was to determine whether age differences existed among college students relative to substance use. The rationale for making age comparisons among college students is that given their limited age range, any age differences would have practical programming implications for substance abuse prevention programs targeted at college students. A series of eight one-way analyses of variance were conducted with indexes of use for each of the eight psychoactive substances mentioned above serving as dependent variables and age, with five levels, serving as the independent variable in each analysis. Results indicated statistically significant age differences for all eight substance use indexes. A review of the means of the age groups (i.e., 19 and younger, 20-21, 22-23, 24-25, 26 and older) indicated a consistent pattern across each substance in which the youngest age group indicated the lowest level of use. The results of this study suggest that college students' levels of substance use are lowest during their earliest period of college experience. Thus, an implication of this study is that substance abuse prevention programs should especially be aimed at the youngest students, before their levels of use increase and their patterns of use in the college environment become established.

A PRELIMINARY STUDY OF JOB-RELATED BURNOUT AMONG HEALTH EDUCATION SPECIALISTS IN TAIWAN

W. William Chen, Ph.D., University of Florida; Laura P. Lu, M.P.H., National Taiwan Normal University; Jenn-Chang Liou, M.S., University of Florida.

Cross-cultural study of job-related burnout symptoms among individuals in the helping profession can be beneficial in the assessment and understanding of this occupational problem. This study was designed to examine the degree of job burnout and the relationship between burnout and gender, age, practice settings, years in the profession, and level of religiosity among health education specialists in ,Taiwan, Republic of China. A survey consisted of Chinese translation of Maslach Burnout Inventory (MBI) and demographic data was mailed to a random sample of 400 members of the National Health Education Association, Republic of China. A total of 186 (46.5%) usable surveys were returned. The MBI assesses three aspects of burnout symptoms. A high degree of burnout is characterized by high scores on the emotional exhaustion (EE>27) and depersonalization (DP>13) and low scores on the personal accomplishment (PA<31). Descriptive statistics and t-test were used to examine the data. Group mean scores for the EE, DP, and PA were 19.01, 5.8, and 33.72 respectively. This result indicated that as a group, the health education specialists in Taiwan were not suffering from high degree of occupational burnout. However, further analysis revealed that 21% of the subjects had EE scores higher than 27, 10.2% had DP scores higher than 13, and 32.7% had PA scores lower than 31. Comparisons between groups revealed that women scored significantly higher than men on the EE subscale (t=2.59, P<.01) and the younger subjects (less than 35 years) scored significantly higher on both EE and DP subscales than the older subjects (t=2.91; t=3.02, P<.01). There were no other significant differences of EE, DP, and PA scores between groups concerning practice settings (public health education vs. school health education), years in the profession (more than 15 years vs. less than 15 years), and level of religiosity (high vs. low). It was concluded that some health education specialists in Taiwan were suffering from job-related burnout symptoms, especially women and younger professionals and there is a need for stress management training.

THE BURNOUT SYNDROME IN UNIVERSITY PROFESSORS.

Terri Mulkins Manning, Ed.D, The University of North Carolina at Charlotte

Occupational stress in college professors or the "burnout syndrome" has become a major focus of research. Burnout among college professors affects their emotional well-being, the quality of their teaching and is a probable cause of some of the distant, insensitive behaviors and reduced creativity among the professorate. The purpose of this study was to determine if there is a relationship in perceived levels of occupational stress and academic load and rank and to determine if external responsibilities were exacerbating factors. A random sample of assistant, associate and full professors from a large southwestern university was surveyed using a faculty questionnaire and Maslach's Burnout Inventory Form Ed (MBI-ED). The faculty questionnaire assessed family responsibilities, rank, teaching load, research responsibilities and service activities. Maslach's Burnout Inventory, an established instrument designed to measure burnout in occupations where "people contact" is made, produces three submeasurements of burnout: emotional exhaustion, depersonalization and personal accomplishment. With a return rate of 60% (N-120), the instruments were scored and it was found that 100% of the professors who returned the surveys ranked "highly burned out" on all three subscales. Based on the literature, it was anticipated that faculty differences in burnout would occur based on family responsibilities, teaching load and rank, but through analysis of variance, no differences were found. A t-test with pooled variance estimates was calculated based on research responsibilities (those who devoted less than 20% of their time to research versus those who devoted 20% or more of their time to research) and it was found that faculty heavily involved in research scored significantly higher on burnout scales than those less heavily involved. It was therefore concluded that research responsibilities significantly contributed (<.05) to burnout levels. Although differences in burnout were expected with greater family responsibility and work load, burnout among all faculty was so high that determining the effects of these variables was impossible.

EFFECTS OF NUTRITIONAL STATUS ON CHILDREN'S STRENGTH MEASURES AND COGNITIVE BEHAVIORAL FUNCTIONING. Dr. George White, Dr. Robert Hetiey, Dr. David Barrett, Clemson University; and Dr. Mark Maneval, University of Southern Mississippi.

The purpose of this study was to examine the influence of nutritional variables on cognitive functioning and strength measures of disadvantaged preschool children. Subjects were ninety eight four-year old children, fourty-four were boys and fifty-four were girls. Nutritional assessments were made at the beginning of the school year. Assessments were made of height for age, weight for height, and hematocrit. Anthropometric data were converted to Z scores, percentiles and percent of median scores based on National Center for Health Statistics data. Data on demographic characteristics, health history, and current home nutrition were obtained. Children were tested on the Kraus-Weber Strength Tests, and the Weschsler Preschool and Primary Scales of Intelligence (WPPI). Teachers filled out the Preschool Behavior Questionnaire (PBQ). Data analyses examined the impact of nutritional status on behavior by correlating the anthropometric, and home nutrient intake scores with scores on the dependent variables. The results determined that the children were growing normally. The mean height for age and weight for height were at the 52nd and 50th percentiles, respectively. Cognitive testing showed impoverished verbal abilities. The average WPPSI IQ in the sample was 88. Scores on the PBQ were normal, relative to published data. Measures of home environment were strongly related to cognitive functioning. The strength tests results mirrored national passing rates with no apparent difficiencies. In conclusion, in an impoverished preschool population, child nutritional variables were not predictive of behavioral functioning. Information about family composition and family stability was predictive of the child's academic success. The failure to identify significant nutrition-behavior and strength relationships appears to be due to the unexpectedly high nutritional status of the subjects.

THE EFFECTS OF REWARDS AND FEEDBACK ON INTRINSICALLY MOTIVATING PHYSICAL ACTIVITY

William J. Rutherford, Tzerlin Prong & Charles B. Corbin, Arizona State University

Health promotion programs which include fitness screenings sometimes offer rewards which are thought to encourage exercise involvement. This experiment was designed to examine whether these rewards or the kind of feedback received enhance fitness test performance and/or the intrinsic motivation to perform physical activity. Subjects (N = 64) performed two fitness tests under randomly assigned conditions of reward/feedback, no reward/feedback, reward/no feedback, or no reward/no feedback. The Intrinsic Motivation Inventory was administered following the treatment to all subjects. A t-test revealed, as expected, that potential monetary rewards did not improve fitness test performance. A 2 x 2 factorial ANOVA indicated that neither the prospect of a reward nor the administration of positive or negative feedback, given on the first fitness test, produced differences among groups in performance on a second fitness test. However, positive feedback was found to increase intrinsic motivation while negative feedback, from the experience of failure on an initial fitness task, led to decreased intrinsic motivation. As well, failure, after being promised a financial reward for success, resulted in a loss of interest and enjoyment in performing fitness tasks. It was concluded that money has little motivational value as a reward for fitness performance and that exercisers may well respond more favorably to positive feedback.

THE EFFECT OF PUBLIC CHOLESTEROL SCREENING PROGRAMS ON HEALTH BEHAVIORS

Kathleen C. Gulick, Larry D. Hensley, Forrest A. Dolgener, University of Northern Iowa, Cedar Falls

Hypercholesterolemia is widely acknowledged to be one of the risk factors associated with coronary heart disease (CHD), the number one killer of Americans. As an initial intervention step, health education officials have recommended that adults be knowledgeable of their own serum cholesterol levels. Consequently, public cholesterol screening programs have been implemented throughout the country in an effort to alert people of their cholesterol levels. The purpose of this study was to investigate subject compliance to recommendations provided to moderate- and high-risk invididuals following a public cholesterol screening. Subjects were 132 adult males and females who voluntarily participated in a public cholesterol screening program sponsored by the American Red Cross and who were identified as having cholesterol values at or above 200 mg/dl. Total serum cholesterol was determined through the use of a finger-stick method and a Reflotron analyzer. Subjects whose cholesterol level was above 200 mg/dl were counseled to (1) reduce dietary cholesterol and saturated fat consumption, (2) initiate an appropriate exercise program, and for persons whose cholesterol was above 240 mg/dl or who had two additional CHD risk factors, (3) consult a physician. One month following the cholesterol screening and counseling, subjects were contacted through a telephone interview to ascertain what action they had taken or were planning to take concerning their heightened cholesterol level. Results indicated that 77.3% of all subjects reported that they had reduced fat and dietary cholesterol consumption, 34.8% had increased their exercise level, and 47.3% of those advised to see a physician had done so or were planning to do so. Furthermore, a significant difference in compliance to counseling advice was found across age groups, with the middle-age group (30-59 yrs) generally found to be less compliant with the recommendations. Subjects with reported cholesterol above 240 mg/dl demonstrated the highest rate of compliance to all three of the recommendations provided during the screening. Although the results of this study do not establish a cause and effect relationship and it is recognized that many factors may influence a person's decision to act or not act, the findings are consistent with those previously reported by the Lipid Research Clinic which suggest that once people are alerted to their elevated cholesterol levels, they will take action to reduce those levels. Based upon the findings of this study it would be reasonable to encourage the continuance of public cholesterol screening programs in an effort to alert people of their cholesterol level and to motivate at-risk individuals to take personally appropriate action to reduce their cholesterol level.

DEVELOPMENT AND IMPLEMENTATION OF A HEALTH PROMOTION PROGRAM FOR A SMALL BUSINESS.

Marianne Neighbors, University of Arkansas, Rick Guyton, University of Arkansas

Health promotion programs have emerged as a major component of health care delivery services in occupational settings within the last decade. Promoting health and wellness within a worksite setting has been shown to have an impact on the welfare of employees. The increasing costs of health care have further contributed to the proliferation of worksite wellness programs in businesses. Company-sponsored health promotion programs have been designed to meet the specific needs of the employees to reduce the risk of chronic diseases within the employee population. Although there have been many worksite health promotion programs in large corporations, there have been few programs designed for, and implemented in the small business setting. The purpose of this study was to design, implement and evaluate the effectiveness of a structured health promotion program administered to a population of employees within a small corporation. The structured health promotion program consisting of five presentations (interpretation of health risk data, stress management, nutrition, fitness, and cancer detection and prevention) was administered to the experimental group of 44 subjects. The control group of 43 subjects did not receive the structured health promotion program. Pretests, posttests and delayed posttests including the Wellness Check instrument, the Health Locus of Control instrument, and a battery of health screening tests (blood pressure, body weight, blood glucose, blood cholesterol, and percent body fat) were administered to both the experimental group and the control group. The statistical analyses utilized included the independent *t* test, dependent *t* test, Chi-square test of independence, Chi-square goodness of fit test, analysis of covariance, and Pearson produce moment correlation. The level of significance used was 0.05. The findings from this study revealed that the administration of the structured health promotion program did not yield significant differences in the health risk status or Health Locus of Control scores of the participants as compared to the nonparticipants. The majority of the subjects in both groups reported positive changes in their health behaviors as indicated by the Wellness Check scores. Both groups lowered their blood glucose levels and percent body fat scores significantly. The subjects in the experimental group also lowered their cholesterol levels a significant amount from the pretest to the delayed posttest time. Participation in the structured health promotion program did not affect the absentee rates nor the health insurance plan utilization rates of any of the subjects. However, both the participants and the nonparticipants in the structured health promotion program had significantly lower posttreatment absentee rates. The results also indicated that subjects who had an Internal Health Locus of Control had higher scores on the Wellness Check health risk inventory than subjects that had an external Health Locus of Control.

THE RELATIONSHIP OF AIDS' KNOWLEDGE TO THE SEXUAL BEHAVIOR AND ATTITUDES OF HIGH SCHOOL AND COLLEGE STUDENTS.

Barbara Thompson, Florida A&M University; Dewayne J. Johnson, Florida State University; and Virden Evans, Florida A&M University.

The purpose of this study was to determine the the relationship between the level of knowledge about AIDS and the sexual behavior and attitudes of high school and college students, and to determine if differences existed in the level of knowledge of high school and college students. The subjects for this study consisted of a cluster sampling of 186 college students (males=94, females=92) and 198 high school students (males=76, females=122) enrolled in a basic health course at two universities and two high schools. A 25-item forced-choice inventory consisting of cognitive and demographic items based on the brochure prepared by the National Centers for Disease Control was distributed to all subjects. ANOVA and stepwise multiple regression was used to analyze the data. The dependent variable was a knowledge score, with sex and educational level the independent variables for ANOVA, and all demographic variables the independent variables for the regression analysis. Results indicated that there were no significant differences in the knowledge by main effects (sex and educational level). However, significant interaction did determine that high school females knew significantly more than high school males or college females. Knowledge scores of college males were not different from the other three subgroups. A significant relationship could not be found between knowledge and any of the independent variables. Regression analysis failed to identify a set of factors that accounted for a significant amount of the variation in the total knowledge score of the subjects. The first six variables entered into the regression formula were age, use of marijuana, grade level, frequency of intercourse, sex (male/female), and use of other recreational drugs. These variables, however, only provided a R squared of .08. This data suggests that sexual and drug abuse behavior of high school and college students may be related to knowledge of AIDS. Also, high school students who were only beginning a basic health course had as much knowledge of AIDS as did college students. These findings suggest that existing courses in the high school curriculum that has cognitive content related to AIDS are not affecting the knowledge level of students who take those courses.

THE IMPACT OF A SCHEDULED FITNESS WORKOUT ON FITNESS SCORES OF MIDDLE SCHOOL BOYS AND GIRLS. Dewayne J. Johnson, Susan K. Lynn, Jeff Hogan, and Al Blizzard, The Florida State University.

The purpose of this study was to determine the impact of a year-long regularly scheduled fitness workout on selected health related fitness components of middle school boys and girls, and whether there were differences between boys and girls. The subjects for this study were 75 middle school students (boys=35; girls=40). Each student participated in a 10-minute exercise bout daily. This exercise bout was specifically designed for each student based on their level of fitness on a pre-test for the one mile run, situps, pullups, and the sit-and-reach. The Physical Best Health Fitness Standards were used as criteria for evaluation of the results, not the raw scores. Chi Square was used to determine if there was a significant increase in the number of subjects who was at or above the health fitness standard and whether there was a difference in the rate of improvement of boys and girls. Chi square results indicated that there was a significant increase in the number of students who were at or above the health fitness standard for each of the health related components, with the boys showing improvement for all four components tested, and the girls showing improvement for flexibility and situps. When a comparison was made between the number of boys and girls who reached the health fitness standards, chi square showed significant differences on the pre-test with the girls scoring better for cardiovascular and situps, while there were no differences for pullups and flexibility. On the posttest, girls again scored significant higher while the boys scored higher for pullups. No differences were found on the posttest for flexibility or situps. Based on the results of this study, it may be concluded that a short, planned exercise routine, individually designed based on individual fitness scores, can be effective in improving the fitness of middle school students. These results also indicated that boys and girls will improve approximately at the same rate on most of the health related components of fitness, but that boys will improve more rapidly on upper body strength measures such as pullups.

PERSONAL INCENTIVES AND HEALTH: DIFFERENCES IN GROUPS DEFINED BY GENDER AND PARTICIPATION STATUS IN A WORKSITE HEALTH SCREENING.

Linda J. Stonecipher, Ph.D., University of Texas-Arlington; Marlene K. Tappe, Ph.D., Purdue University.

The study investigated the motivational determinants of employees toward health. Personal Investment Theory proposes that investment in health-related behaviors is dependent upon the meaning of the behavior to the person. Personal investment meaning is comprised of six interrelated facets: personal incentives, sense of self perceptions, perceived barriers, perceived options, perceived situational opportunities, and perceived situational culture. A comprehensive questionnaire which assessed three of the meaning facets (personal incentives, sense of self perceptions, perceived barriers), as well as their health practices, was administered to 399 male (n = 337) and female (n = 62) employees at a small midwestern manufacturing company (M age = 38.4). One week after the baseline data were collected, a health screening was offered to all employees. Two hundred forty-six employees participated in the screening. Data were analyzed by descriptive statistics, analysis of variance, and discriminant analysis. The most important incentives to practice health behaviors were promoting wellness, gaining a sense of personal control over health, and appearance/weight control. Less salient personal incentives were family responsibilities, sport performance, social affiliation, and spiritual beliefs. A two-way analysis of variance indicated a significant interaction ($F = 6.36$, d.f. = 1, 379, $p < .01$) between gender and participation status for the personal incentive appearance/weight control. The saliency of appearance and weight control for male nonparticipants was slightly higher than for female nonparticipants, however, the saliency for the same incentive for male participants was much lower than female participants and also slightly lower than male nonparticipants. For the incentive of sport performance, there was a significant ($F = 10.78$, d.f. = 1, 378, $p < .001$) main effect of gender. Regardless of participation status, men perceived sport performance as more important than women perceived it. Discriminant analysis on health-related motivational determinants for groups defined by gender and participation status revealed two significant functions (Chi-square = 63.58, d.f. = 30, $p < .001$; Chi-square = 28.50, d.f. = 18, $p < .05$) which accounted for 88.35% of the variance between groups. The results of this investigation suggest that worksite health promotion programs should be sensitive to differences among subpopulations of employees regarding their reasons for engaging in health practices. Further, the results support the application of Personal Investment Theory to the study of global health practices. Understanding of the motivational determinants of health behaviors of subpopulations of employees provide valuable insight for further research as well as development and implementation of effective worksite health promotion and education interventions.

CHANGES IN HEALTH PRACTICES FOLLOWING A WORKSITE HEALTH SCREENING: DIFFERENCES BETWEEN PARTICIPANTS AND NONPARTICIPANTS.

Gerald Hyner, Ph.D., Purdue University; Linda Stonecipher, Ph.D., University of Texas-Arlington, Roseann Lyle, Ph.D., Purdue University.

The purpose of this study was to determine the efficacy of a worksite health screening in fostering healthful lifestyle changes of employees. A comprehensive questionnaire which assessed health practices and motivational determinants of health practices was administered to employees before ($n = 403$, 88.4%) and after ($n = 242$, 53.1%) a worksite health screening. Fifty-four percent of the employees ($n = 242$) participated in the screening which included physiologic assessments, a health risk appraisal (CDC, 1987), and a comprehensive educational followup session one week after the assessment. Independent t-tests indicated that employees who participated in the health screening scored significantly ($p < .05$) higher on 7 of the 20 health practices at the pre-screening session than employees who did not participate in the health screening. A repeated measures analysis of variance indicated that there was a significant interaction between participation status and trial for five health practices. There was a significant interaction for three dietary practices: limiting intake of salt ($F = 8.72$, d.f. = 1, 218, $p < .01$), limiting intake of sugar ($F = 7.77$, d.f. = 1, 217, $p < .01$), and eating foods with fiber ($F = 4.37$, d.f. = 1, 217, $p < .05$). For each of these dietary practices, participants had slightly lower scores than nonparticipants at the pre-screening assessment, but at the post-screening assessment participants had much higher scores than nonparticipants, that is, compared to pre-screening, participants' scores increased while nonparticipants' scores did not change or decreased slightly. There was also a significant interaction ($F = 5.08$, d.f. = 1, 219, $p < .05$) between participation status and trial for the health practice of reserving time for exercise. The relationship among the four groups was basically similar to the relationship among the groups for dietary habits. There was a significant interaction ($F = 4.93$, d.f. = 1, 217, $p < .05$) between participation status and trial for the variable, feeling depressed. At the pre-screening trial, nonparticipants were less likely to feel depressed than participants. At the post-screening trial, nonparticipants were still less likely to feel depressed than participants, but the difference between the groups decreased. These results suggested that a worksite health screening fostered the development of several healthful practices for employees who participated in the screening while employees who did not participate in the screening did not alter their health behaviors. Further, as nonparticipants generally had lower pre-screening scores than participants, it seemed that the group which would benefit most from a worksite health promotion program was least likely to participate in even a minimal intervention strategy such as a health screening. Further research should focus on differences in motivational determinants of health behavior of participants and nonparticipants in order to gain a better understanding of those factors which enhance health-promoting behaviors.

PERCEIVED BARRIERS TO HEALTH PRACTICES: DIFFERENCES IN GROUPS DEFINED BY GENDER AND PARTICIPATION STATUS IN A WORKSITE HEALTH SCREENING.

Marlene K. Tappe, Ph.D., Purdue University; Linda J. Stonecipher, Ph.D., University of Texas-Arlington.

One of the best predictors of involvement in preventive health behavior is the perceived barriers construct from the Health Belief Model. The two major purposes of this investigation were to determine the following: one, the perceived barriers to engagement in health practices among worksite employees and two, differences in these perceived barriers between groups defined by gender and participation status in a worksite health screening. A 20-item Likert-type questionnaire and a 20-item Health Practices Survey was administered to 399 male ($n = 337$) and female ($n = 62$) employees at a small midwestern manufacturing company. One week following assessment of the baseline data employees had the opportunity to participate in a worksite health screening on company time; 246 employees participated in the screening. Descriptive statistics and analysis of variance were used to analyze the data. For this population of employees, the major barriers to practice health behaviors were lack of motivation, lack of self-discipline, time, unwillingness to sacrifice benefits of a habit, and lack of money. A two-way ANOVA indicated a significant gender main effect for five barriers. Male employees had significantly higher scores than female employees for each of the five barriers. A two-way ANOVA also indicated a significant group main effect for two barriers. Employees who participated in the health screening scored significantly higher for the barriers, lack of motivation ($F = 3.84$, d.f. = 1, $p < .05$) and lack of self-discipline ($F = 3.71$, d.f. = 1, $p < .05$) than employees who did not participate in the health screening. Salient barriers for participants were lack of self-discipline, lack of support from friends, and family responsibilities while salient barriers for nonparticipants were peer pressure and lack of support from family members. The results of this study suggest that interventions in worksite health promotion should provide employees with strategies and skills to overcome the barriers of lack of motivation, self discipline and time. Further, the results suggest that there are differences in perceived barriers to health practices between groups defined by gender and between groups defined by participation status in a worksite health screening. It is important that worksite health promotion programs be sensitive to differences in subpopulations of employees regarding these barriers so that interventions can be effectively implemented.

63

COMPARISON OF METHODS FOR TEACHING SELF-EVALUATION OF HEALTHFUL LEVELS OF BODY FATNESS

Lisa A. Chase, C.B. Corbin and William J. Rutherford, Arizona State University

Recent evidence suggests that individual body fatness is associated with various health problems. Because of this link to health status, body fatness is important when assessing health related fitness. Body fatness measures are a part of various fitness batteries, such as Fitnessgram and Physical Best, and virtually all fitness books. However, many methods of body fatness assessment are costly and require special equipment or services of an expert tester. Recent research has shown that individuals can be taught to make reliable and valid self-measurements of skinfolds when trained properly. These studies used extensive training, expensive calipers and were done with lean to average fatness groups. The purpose of this study was to determine the effectiveness of two different teaching techniques for making self-evaluations of body fatness. In addition the type of caliper and level of the fatness of the subject was considered. Eighty-four college-aged females served as subjects. Half of the subjects were taught to do self-measures of skinfold thicknesses using written instructions only. The other half received written instructions and verbal instruction from experts. Within instruction groups, subjects were randomly assigned to use either a Harpenden caliper or the Adipometer. Within each of the instruction-caliper groups, the subjects were predetermined to be low in fatness or high fat, based on expert pre-experiment measures. A 2 (instruction type) X 2 (caliper type) X 2 (fatness level) ANOVA was used to analyze the data. Post hoc tests were made using Duncan's Multiple Range Test. Seven different skinfold thicknesses were the dependent variables. Results indicate that subjects in the written/verbal instruction group made significantly ($p=.05$) better measurements than the group using only written instructions. The high fat group was less able to make accurate measurements than the lower fat group ($p=.001$), though both groups were able to make reliable measurements ($r=.97$-$.98$). Reliable self-measurements of skinfold thicknesses may be important in monitoring fatness changes at specific sites of the body, as android fat distribution is associated with increased risk of diabetes and atherosclerosis. Five of the seven skinfolds measurements were statistically similar for the Adipometer and the Harpenden caliper. Inexpensive calipers apparently can be used for self-measurements if proper instructions are provided. Self-evaluations of body fatness may be useful in helping adults to establish realistic goals for healthy levels of body fatness.

EXPLORATORY INVESTIGATION OF THE RELATIONSHIP BETWEEN FEMALE COLLEGE STUDENT'S LEVEL OF EXERCISE AND FIVE PREMENSTRUAL SYMPTOMS.

Susan R. Immel, Iowa State University.

Although exercise has been suggested as one possible therapy for premenstrual syndrome (PMS), the relationship between different PMS symptoms and participation in physical exercise has received little investigation. Thus, the purpose of this investigation was to examine the relationship between each of five (PMS) symptoms and female college student's self-reported level of exercise. Instruments were administered to 198 female college students enrolled in an elective health study class (first aid) at Iowa State University. All subjects completed the Premenstrual Assessment Form (PAF) (Halbreich et al., 1982). It contains 95 Lickert scale items scored from 1(indicating none or very little change from normal) to 6 (indicating extreme change from normal). Items were concerned with emotional status, mood shifts, and physical pain or discomfort which may be experienced during the premenstrual phase of the menstrual cycle. The five PAF symptoms of depression, water retention, general physical discomfort, autonomic physical changes and fatigue were utilized. Self-report exercise data included: frequency, duration, and intensity. Subjects categorized as heavy exercisers met a minimum requirement of at least three, 20 minute session/week at a perceived exertion of at least "sweating, breathing somewhat heavily." Subjects who exercised, but less than 60 minutes/week were categorized as light exercisers. Data indicated that general physical discomfort (60%), depression (64%), and water retention (62%) were the most frequently identified PMS symptoms while fatigue (35%) and autonomic physical change syndrome (22%) were less frequently identified. This distribution of PMS symptoms is similar to that reported in other researchers using the PAF. Chi square analysis for the association between each symptom and exercise level revealed no significant relationships (p-values ranged from .91 to .06). Although only the association between exercise and the symptom of general physical discomfort approached statistical significance, close examination of the data for several of the symptoms suggests that rather than a linear relationship, there may exist a curvilinear exercise dose-symptom response relationship. Heavy exercise may not be associated with a decrease in PMS symptoms. Also examined was the relationship between the use of oral contraceptives and PMS and once again, no significant associations were noted between PMS symptom and subject's use of oral contraceptives. Clearly, further research is needed. We must examine not only the level of relationship, but also look closely at explanations for a relationship between exercise and PMS.

OPEN AIRWAYS AS AN EDUCATIONAL INTERVENTION TO HELP MANAGE ASTHMA IN CHILDREN

Esther L. Moe, Ph.D., Jay Eisenberg, M.D., Michael A. Wall, M.D., Oregon Health Sciences University, William Vollmer, Ph.D., Victor Stevens, Ph.D., and Jack Hollis, Ph.D., Kaiser Permanente Center for Health Research.

The management of chronic illness in children includes patient and family health education as an essential part of quality comprehensive care. The purpose of this study was to investigate the effectiveness of Open Airways asthma educational classes in parental management of their child's asthma. Seventy four children ages 4-14 and their families were randomized into 7 class cohorts; 4 for families with children ages 4-7, 3 for ages 8-14. Open Airways was selected as the curriculum. Modifications to the program included an increased emphasis on behavioral change, a physician presentation regarding medication, the development of a handout detailing medication information, and the adjustment of the curriculum to be relative to our population. Eighty four per cent of the 74 families randomized into the Open Airways program attended at least 1 class, with 38% attending all 6 classes. Phone calls and letters were sent to increase attendance, information and make-up classes were offered to increase knowledge. A questionnaire was developed and administered at the completion of the classes to evaluate participant's perceptions of the classes and the change in the parent's confidence in handling their child's asthma. Responses to the questions to ranged from 1 indicating "not at all" to 5 indicating "extremely". Overall, parents felt the classes were beneficial to the family ($x=3.9$; $SD=.97$). There was a significant improvement in parental confidence in understanding and management of their child's asthma from prior ($x=2.7$; $SD=1.1$) to the completion of the class ($x=4.2$; $SD=.63$) ($p<.001$). Positive behavioral changes reported to be made as a result of the classes included earlier medication intervention, an earlier recognition of symptoms, and improved communication regarding asthma within the family and with the health care provider. With slight modification, Open Airways is effective in augmenting the family's ability to improve asthma management skills, and instill more confidence in caring for the child with asthma.

EXAMINATION OF THE FACTOR STRUCTURE OF THE HEALTH BELIEF MODEL INVENTORY UTILIZING DATA COLLECTED FROM EMPLOYEES OF A MEDICAL CENTER.

Dean F. Anderson and Charles M. Cychosz, Iowa State University

The primary purpose of this investigation was to further examine the factor structure of the multidimensional Health Belief Model Inventory (HBMI). Developed using theoretical constructs from the Health Belief Model, this instrument has been utilized in past research in attempts to identify attitudes associated with adoption of exercise behavior. Instruments were mailed to 800 randomly selected employees of Iowa Methodist Medical Center as well as another 351 employees who were members of the IMMC Health and Fitness Center. Data were obtained from 511 of 1151 (45%) employees in the initial mailing. The 43-item HBMI represented a hypothetical structure consisting of five factors labeled: Susceptibility (10 items), Benefits (11 items), Barriers (13 items), Social Influences (5 items) and Cues to Action (4 items). Confirmatory factor analysis was conducted using the LISREL VI program to determine the extent to which these data fit the hypothesized model. The chi-square value obtained ($x^2(850)=4361$, $p>.000$) was large indicating that these data may depart from the proposed model. However, many experts note that even minor departures may yield significant chi-square values and even large chi-square to degrees of freedom ratios may be obtained in large samples with a large number of items. Thus, one is cautioned against a literal interpretation of the chi-square. With this sample, the high coefficient of determination (.97) as well as the goodness-of-fit index (.69) suggest that the proposed five factor structure fits these data quite well. In the hypothesized model, most factor loadings were over .45. All t-values were significant ($p<.05$) suggesting that the 43 items were appropriately group. Although this confirmatory analysis supports the five factor structure, results also reveal that some of the factors are related. This finding is not inconsistent with the theoretical model.

PERCEPTIONS OF PHYSICAL APPEARANCE AND THEIR RELATIONSHIP TO HEIGHT, WEIGHT, AND SKINFOLD MEASUREMENTS AMONG CHILDREN

Charles B. Corbin and Robert P. Pangrazi, Arizona State University
Gene Peterson and Debbie Pangrazi, Mesa Public Schools

Young children tend to have general rather than specific self-perceptions. As they grow older such factors as perceptions of physical attractiveness become more important. Comparison to peers and other information gained from social interactions are responsible for the development of each child's perception of physical attractiveness. The purpose of this study was to investigate the relationships among the most common anthropometric measurements administered in schools and a measure of self-perceived physical attractiveness. Measurements were made on a total of 482 boys and 556 girls in grades 3 through 6. The physical appearance subscale of the Harter Self-perception Scale was used. In addition, height, weight, subscapular, triceps, and umbilicus skinfolds were measured. As would be expected, girls had significantly thicker skinfolds than boys on all three measures ($\underline{p} > .05$). For girls, all skinfolds except one had relationships to perceptions of physical appearance that exceeded .20 at all grade levels. These relationships ranged from -.193 to -.445 and were similar at all grade levels. By grade 6, weight was also a negative predictor of perceptions of physical appearance for girls ($r = -.355$). For boys, at no age did weight have a higher correlation to perceptions of physical appearance than .134 (grade 6). Relationships of skinfold measures to perceptions of physical appearance for boys were stronger in the upper grades than in the lower grades. In most cases, the umbilicus skinfold was the best predictor of perceived physical appearance. Height had no important relationship to feelings of physical appearance. Multiple correlations ranged from -.198 to -.453 for the various age and sex groups ($R^2 = .039$ to $.205$). How children perceive their physical appearance is related to their subcutaneous fatness (measured using skinfolds). For boys fatness is of little importance to these perceptions in the early school years but becomes more important in the upper elementary grades. However, very young girls appear to judge physical appearance by fatness. By grade 6 weight is a significant predictor of feelings about physical appearance. The findings suggest the need to educate children, especially girls about realistic health standards for various measurements such as height, weight, skinfold thickness so that they may set realistic goals for attaining optimal perceptions of self; something that is very important to preteen and teen aged youth.

GENDER DIFFERENCES IN THE FACTOR STRUCTURES OF ALCOHOL USE, MOTIVES, ATTITUDES AND CONSEQUENCES AMONG COLLEGE STUDENTS.

Eugene R.D. Deisinger, Charles M. Cychosz, Fred H. Borgen, Iowa State University.

This investigation explored gender differences in alcohol use, motives, attitudes, and consequences among college students at a large midwestern university. Epidemiologic evidence from college campuses has clearly delineated differential effects for males and females, yet current empirical and theoretical models have tended to focus on individual consequences rather than behavior patterns. A 74-item instrument was administered to 490 students in introductory Psychology and Health Education courses. Fifty-six non-users were excluded from further analysis. The instrument contained questions on demographics and family history (25 items), alcohol use (8), motives for use (13), consequences (12), attitudes (8), and additional questions on drug use. Alpha reliabilities were .83 for motives, .71 attitudes, and .84 for consequences. An exploratory factor analysis was conducted for each of the four subscales. Interpretable factor structures were extracted for each subscale. A two-factor pattern emerged for the alcohol use variables and was clearly interpretable as past use and current use. A three-factor pattern of motives was intepreted as social isolation, depression, and physical effects. Attitudes revealed a two factor pattern reflecting social acceptability of intervention and the importance of alcohol in social interactions. Consequences revealed three factors interpreted as social, physical, and emotional consequences. A MANOVA revealed significant [F(10,399)=7.36, P=0.0001] gender differences. Univariate tests of significance identified significantly higher male cohort scores on current use, social interactions, drinker identity, physical effects motives, social consequences, and social inportance of alcohol. Female cohort scores were significantly higher than males on acceptability of interventions. These findings suggest that the continuum of drinking behaviors, motives, attitudes, and consequences can be reduced to interpretable components which differ by gender. Based on these findings, the development of gender specific program interventions is recommended.

HEALTH PRACTICES OF NATIVE AMERICAN 8TH AND 10TH GRADE STUDENTS. Larry K. Olsen, Professor, MinQi Wang, Assistant Professor, Michael Ludwig, Grad. Asst. Dept. of Health Education, Penn State, University Park.

The purpose of this study was to analyze the health practices of Native American (NA) 8th and 10th grade students who were involved in the National Adolescent Student Health Survey (NASHS) and compare these reported behaviors with those reported in the Indian Adolescent Health Survey (IAHS). This study represents a secondary analysis of two available databases to examine convergence and divergence issues in conducting such studies. The study population consisted of 100 8th and 10th grade NA students who were included in the NASHS and 347 8th and 10th grade NA students who were involved in the IAHS. Although specific questions within each of the questionnaires for the two surveys differed, there were enough common items to warrant a comparison of these two groups. Of particular interest were the areas of use of tobacco products, alcohol, and illegal drugs. Significant differences were noted between and within grades across the sample populations for all categories of substance use. Significantly more of the students in the IAHS indicated use of all of the substances in question. For example, within the NASHS, 81.5% of the 8th graders and 68.6% of the 105 10th graders indicated that they never smoked cigarettes. The corresponding percentages for the IAHS students was 57.6% for the 8th graders and 58.8% for the 10th graders who indicated that they had never utilized cigarettes. These same disparities appear for all categories examined. Comparisons between the present and prior studies of substance use of NA adolescents indicate that the data included in the NASHS database for the NA population appears to be under reported.

THE IMPORTANCE OF DECISION FACTORS, NUTRITION ATTITUDES, AND KNOWLEDGE IN CAFETERIA FOOD CHOICES OF COLLEGE STUDENTS.

Liane M. Summerfield and Rebecca Pliske, Marymount University.

College health educators face an important challenge in helping students adopt healthy eating practices. Research has not clearly established which of many factors -- nutrition attitudes, knowledge, food appearance, culture -- most predictably guides food choice. The role of factors present in the eating environment itself (decision factors) has not been studied. This study examined the relationship between nutrition knowledge, attitudes, decision factors, and cafeteria food choice in 23 female and 6 male resident students (X age = 19 years). Ss filled out a food intake and point-of-choice decision factor questionnaire every day at lunch for 10 week days. Nutrition knowledge was assessed by a multiple choice test. Nutrition attitudes and decision-factors-in-retrospect were surveyed two weeks after cafeteria data collection. Neither knowledge nor attitudes affected food choice among subjects in this study. Point-of-choice decision factors (DFC) which were most influential in subjects' choice of food in the cafeteria line were those that involved the appearance of the food. Nutritional value of the food chosen was fourth in importance. Ss who reported that they considered the nutritional value of the available food when making their selection chose lower calorie but not lower fat foods. Ss who reported that the calorie content of the available foods was important in making their food choice chose nutritious items but not low fat items. Thus, although knowledge level was good, Ss tended to equate "nutritional value" with low calorie rather than with low fat, and the sample had difficulty identifying low fat foods. Two weeks after cafeteria data collection, Ss were asked to assign points retrospectively to a list of decision factors (DFR) that they believed influenced their selection of food. On the average, Ss rated the appearance of food as the most important DFR, although nutritional value of food was a more important factor in retrospect than at the point-of-choice. Results of this study suggest that nutrition education efforts must consider not only general knowledge required to make healthy food choices, but the influence of many factors in the eating environment that affect food choice decisions.

BEST COPY AVAILABLE

ACQUAINTANCE RAPE AND SEXUAL AGGRESSION AS PORTRAYED ON THE TELEVISION PROGRAMS

N. Ruth Ahia, University of Arkansas

Several researchers have consistently reported that acquaintance rape (AR) and sexual aggression (SA) are far more prevalent in dating situations than are generally acknowledged. This study seeks to analyze the accuracy of the content of AR and SA from the perspective of television presentations. Key to this analysis was that television has been the most frequently studied source and in fact, credible source of information medium on various issues including health-related issues. Three television programs featuring AR and SA were pre-recorded during summer and fall of 1989. A checklist instrument consisting of 120 items were developed based on the reviews of related literature. Jurors assessed the items in the instrument for comprehensiveness, conciseness, simplicity and clarity of language. The internal consistency of the items in the instrument was assessed and reported as Cronbach alpha = .69. Fifteen undergraduate students (nine females and six males) voluntarily utilized the validated checklist instrument to assess the content and the accuracy of information on AR/SA as portrayed in three television programs. The results of content analysis demonstrate that (1) risks and situational factors (substance and food use, loud music), (2) victim's post-rape reaction (self denigration, unwillingness to report incidents or seek counseling/treatment), (3) assailant's post-rape reaction (intimidation of victim, adversarial sexual behavior, verbal abuse, disproving victims credibility of incidence if exposed and attribution of blame), were the variables in AR/SA that were most clearly and accurately portrayed. Although the legal line of defense as portrayed in programs perpetuated some of the AR myths/misconception (i.e., victim responsibility in rape or aggresion precipitation and sexual conservatism), verdicts clearly demonstrated that AR/SA are punishable. Demographic characteristics of assailants vs. victims as portrayed was misleading by showing only white, middle class as victims and assailants. Institutional response (university administrators) were quite different, i.e., non-supportive and unfavorable to victims compared to societal (rape crisis counselors, health care workers and jurors). The findings suggest that health educators involved in AR/SA programs should: (1) endeavor to reach administrators as well as attorneys about AR/SA and their debilitating effects on individuals, (2) assist students (both male and female) to personalize the existence of AR/SA, (3) institutional policies concerning AR/SA should be clearly stated, implemented, and reviewed.

ASSESSMENT OF KNOWLEDGE AND ATTITUDES ABOUT ALCOHOL AND OTHER DRUGS AMONG ELEMENTARY AND MIDDLE SCHOOL TEACHERS

M.T. Wessel, D.M. Videto, H.R. Travis, S.H. Stewart and H.K. Amato, James Madison University

Use of alcohol and other drugs have been recognized as a growing problem in our nation's schools. Research suggests that an organized, coordinated alcohol and other drug prevention program by the schools can reduce drug problems and identify potential problems early. An important first step in developing prevention programs is having qualified teachers. Teachers who are knowledgeable about alcohol and other drugs and have positive, committed attitudes toward prevention are more likely to be effective in affecting student behavior. This study was designed to assess changes in teacher knowledge and attitudes following training workshops on alcohol and other drugs. Two training workshops for elementary and middle school teachers were conducted, with 360 teachers attending. Each workshop lasted three days and served to introduce the new state curriculum on the prevention of alcohol and other drug use. Workshop sessions were conducted on alcohol and drug knowledge, improving teaching techniques, recognizing abuse problems, and working with resources in the schools and communities to prevent student use of alcohol and other drugs. A randomized control-group pre-post test design was utilized to assess changes in teacher knowledge and attitudes. A 96 item instrument was developed using questions adapted from tests constructed by the Centers for Disease Control and questions developed from the objectives supplied by the various speakers. The test was then validated and administered. The instrument included 50 questions measuring knowledge and 46 measuring attitudes. These attitude questions encompassed four areas; attitude on drug and alcohol use, attitude about themes in the drug curricula, attitude about messages contained in the drug curricula, and attitudes toward teaching alcohol and other drugs topics. Statistical analysis, using t-tests for related samples, showed significant increases in pre-post scores on the knowledge portion of the examination as well as significant positive changes on the various attitudinal sections. The study is significant in that the results appear to validate the concept of training workshops for teachers as a method of quickly increasing knowledge and positively affecting attitudes.

RELAXATION/COGNITIVE VS. FITNESS EDUCATION FOR STRESS & BURNOUT AMONG SECRETARIES.

L. Rohner & J. Brandon, New Mexico State Univ.

This study investigated the effectiveness of relaxation/cognitive training and fitness education as compared to a control group in reducing measures of occupational stress (OS) and burnout (B) for university secretaries. A second purpose was to determine whether there would be significant differences between groups following training in the use of coping skills. The problem is significant in that both OS and B have been cited as major contributors to the escalating U.S. health care costs. Thirty-five subjects, aged 24-58 (X=43, SD=9), at a Carnegie Level I research institution participated in this study. They were randomly assigned to one of three treatments: 1) relaxation/cognitive training (RCT), 2) fitness education (FE), and 3) a waiting-list control group (C). Both RCT and FE received information on behavior change techniques during the six, one-hour, lunch-time sessions. RCT received instruction in relaxation (progressive relaxation, autogenic training, meditation, and behavioral relaxation training), cognitive restructuring, and communication skills as well. FE included information on structuring a comprehensive, physical fitness program (warm-up, workout, cool-down) and nutrition education. The Maslach Burnout Inventory (MBI) and two subtests from the Occupational Stress Inventory (OSI), each having four scales, were used as dependent measures. The MBI consisted of three measures of B: Emotional Exhaustion (EE), Depersonalization (D), and Personal Achievement (PA). The OSI Personal Strain Questionnaire (PSQ) measured four outcomes of stress: Vocational Strain (VS), Psychological Strain (PSY), Interpersonal Strain (IS), and Physical Strain (PHY). The final OSI subtest, the Personal Resources Questionnaire (PRQ), assessed four coping resources--Recreation (RE), Self-Care (SC), Social Support (SS), and Rational-Cognitive coping (RC). ANOVA was used to analyze the differences between pre- and post-test scores. Significant ($p<.05$) group interactions were observed for two measures of occupational strain: DP and PHY, and for two coping resources: SC and SS. LSD post hoc analyses for DP found significant differences between RCT and FE, but not between either group and C. There were significant differences between both treatments and between FE and C for PHS. Concerning the four coping resource scales, there were significant ($p<.05$) group interactions for SC and SS. In both situations, LSD revealed differences only between RCT and FE, but not between either and C. In conclusion, neither treatments were statistically more significant than C on any MBI subtests, but FE was significantly better than RCT on the PHY scale. Finally, neither group differed from C for practice of any OSI coping resources.

PREDICTION OF STRESS AND BURNOUT AMONG UNIVERSITY SECRETARIES.

Jeffrey Brandon & Lawrence Rohner, New Mexico State University

The purposes of this study were to determine 1) the major predictors of occupational stress (OS) and burnout (B) among secretaries, and 2) the relationship of coping resources with illness and B. OS & B are significant problems which have been cited as major contributors to escalating U.S. health care costs. Seventy-four subjects, aged 22-66 (X=42, SD=10), at a Carnegie Level I research university in the southwest U.S. were recruited from the personnel list. The Maslach Burnout Inventory (MBI), Occupational Stress Inventory (OSI), State-Trait Anxiety Inventory (STAI), and Seriousness of Illness Rating Scale (SIRS) were completed and blood pressure taken. The MBI has three subtests: Emotional Exhaustion (EE), Depersonalization (DP), and Personal Achievement (PA). The Occupational Roles Questionnaire (ORQ) from the OSI was used to assess the following sources of OS: Role Overload (RO), Role Insufficiency (RI), Role Ambiguity (RA), Role Boundary (RB), Responsibility (R), and Physical Environment (PE). Only the trait anxiety (TA) portion of the STAI was used to control for individual differences in "anxiety-proneness" which may affect SIRS responses. Only diastolic blood pressure (DBP) was used as the best objective measure of the long-term pattern of systemic stress. Concerning purpose two, the OSI's Personal Resources Questionnaire (PRQ)--which assessed Recreation (RE), Self-Care (SC), Social Support (SS), and Rational-Cognitive (RC) factors--was used to determine which would be significantly (.05 level) correlated with illness (SIRS) and B. All instruments were completed within one hour's time. DBP was assessed during the same period by Nursing faculty. Multiple regression and Pearson's correlations were used in the data analysis. The ORQ scales, TA, and age were used in efforts to explain the observed variance in each of the MBI scales, the SIRS, and DBP. TA was the only significant ($p < .002$, $R^2 = .14$) predictor for SIRS. Age, RB and PE were significant ($P < .002$, $R^2 = .254$) predictors of PA. While age and RA were statistically significant ($p \leq .0078$) predictors of DP, the R^2 value was low at .129. Regarding purpose two, RE, SS and RC were positively correlated ($p < .05$) with PA, but no other significant correlations were observed. In conclusion, those factors originally proposed as being relevant to university secretaries (such as having multiple bosses, conflicting supervisory demands, undefined job expectations, excessive responsibility, and feeling personally isolated) were generally confirmed as being predictors of at least some aspects of burnout and DBP. Finally, three PRQ resources were related to enhancing career-related self-esteem. It was, however, surprising that the PRQ resources were not related to other MBI measures.

ACADEMIC COURSEWORK AND PROFESSIONAL COMPETENCIES EXPECTED OF ENTRY LEVEL AND EXPERIENCED HEALTH PROMOTION PROFESSIONALS AS VIEWED BY EMPLOYERS AND UNIVERSITY FACULTY MEMBERS.

John W. Schmitt, William T. Weinberg and Cheryl Kolander, University of Louisville.

The primary purpose of this study was to identify the academic coursework and professional competencies that health promotion employees and faculty members from professional preparation programs consider to be most important for entry level and experienced health promotion professionals. The significance of this research is that the views of both health promotion employers and faculty members need to be ascertained before valid curricular decisions and revisions in health promotion professional preparation programs may be made. The questionnaire used in this study was patterned after those developed by Gorman, Brown and DiBrezzo (1986) and McGlaughlin and Taylor (1987). The questionnaire requested each respondent to rate 27 coursework areas and competencies within four general categories (interaction, business, administrative and experience/certification) in terms of their importance for job success and to indicate whether each coursework area and competency was most appropriate for the bachelor's or master's level. Questionnaires were mailed to all health promotion employers (n = 159) and university faculty members (n = 231) listed in the 1988-89 Association for Fitness in Business Directory. One hundred and seven usable questionnaires were returned by the employers (return rate = 67%) and 164 were returned by the faculty members (return rate = 71%). Results indicated that employers and faculty members generally agreed about which competencies and coursework areas are most important for students pursuing careers in health promotion. More specifically, more than 85% of each group agreed that coursework in the areas of exercise principles, nutrition, fitness activities, anatomy and physiology, exercise physiology, exercise prescription and weight control is important for the success of entry level health promotion students. In addition, both groups concurred that the most important competencies were CPR certification, first aid, an internship and interpersonal relations. Both groups generally agreed that business and administrative skills could be taught at either the bachelor's or master's level. Overall, the ratings of health promotion employers and faculty members differed significantly on only nine of the 62 areas included on the questionnaire. Finally, both groups agreed that exercise physiology, health education, physical education and nutrition were most relevant undergraduate majors for success in the health promotion profession. It was therefore concluded that a core of coursework and competency areas may be identified for undergraduate health promotion students that is recognized by both health promotion employers and faculty members.

ADVENTURE THERAPY: PERCEPTIONS OF PATIENTS, THERAPISTS, AND PSYCHIATRISTS

Camille J. Bunting, Texas A&M Univeristy

Adventure therapy has become one of the fastest growing modalities in the mental health profession. This is especially true in the field of adolescent psychiatry where the patients can be much more resistant to therapy than the average adult patient. Although recreation therapy has been a viable mental health tool for a number of years, the adventure therapy movement has gone beyond the traditional concepts of recreation. Since adventure therapy is relatively new, it is important to get a picture of how it is being perceived by the patients and mental health professionals. Therefore, the purpose of this study was to categorize and compare the perceptions of adolescent patients, therapists, and psychiatrists concerning the adventure therapy program at Colonial Hills Hospital in San Antonio, Texas. Using a structured interview format, interviews were conducted and audio tape recorded with 21 teenage patients, 8 licensed therapists, and 14 psychiatrists. All of the patients interviewed had been participants in the adventure therapy program, and the therapists and doctors had worked with participants in the program. All of the questions were open ended and provided no direction for any particular response Each interview was conducted by the same investigator. The taped interviews were transcribed and a panel of independent judges coded and categorized the various responses. Responses from each of the three populations interviewed were organized into two categorization schemes. Categorization scheme I: potential program benefits, perceived success dependents, perceived program weaknesses; and categorization scheme II: relational skills and personal enhancements. Interestingly, all three populations identified teamwork, accomplishment, and self-esteem/self-confidence as impacts of the adventure therapy program with similar frequency, but the patients mentioned their experience of trusting others with more frequency than any other program component. Responses from the therapists and psychiatrists pointed to the need for systematic cooperation between a patient's various therapists, counselors, and doctors. Although the findings of this study cannot be generalized to other adventure therapy settings, the observations are relevant to mental health programs for adolescents.

ADOLESCENT DIETING AND WEIGHT LOSS PRACTICES

Christina Perry-Hunnicutt, University of Nebraska-Lincoln.

Several studies have documented the weight loss practices of adolescents, however, most have focused on adolescent females with eating disorders such as anorexia nervosa and bulimia. Relatively few studies exist that provide data concerning the extent to which adolescent dieters practice good nutrition and whether they differ significantly from adolescent non-dieters in terms of nutrition knowledge and eating practices. Moreover, little is known about the impact of health education and nutrition education on nutrition knowledge, eating practices and dieting methods of adolescents. The results presented in this paper are based on questions from the 1989 National Adolescent Student Health Survey (NASHS) administered to 11,000 adolescent students in grades 8 and 10 nationwide. Results indicate that 61% of the females and 28.4% of the males reported, "changing eating habits or (having) gone on a diet at least once for more than one week to control their weight." The prevalence of dieting was greater among 10th grade females (64%). An examination of methods used by adolescents to control weight reveals the proportion of adolescents exposed to possible risks associated with dieting. The three most frequent methods of dieting by gender were, eating less(62.6%F, 45.6%M), exercising more (57.5%F, 65.8%M), and avoiding sweets (49%F, 38.5%M). Among the higher risk dieting methods, males were more likely to eat high protein foods, choose liquid diets and use laxatives. Females were more likely than males to throw up after eating and use diet pills. Skipping meals was a common practice among dieters and non-dieters, however, skipping was more frequent among female dieters, especially skipping breakfast. Among female dieters, 48.6% skipped breakfast 5 or more times in the last week. Female non-dieters (40%) were more likely than female dieters (32.1%) to snack on candy and donuts. The impact of health education on nutrition knowledge was analyzed. Mean scores indicated that female dieters scored significanly higher (M=6.9) than female non-dieters (M=6.2). Females knew more than males overall and dieters, regardless of gender, reporting having had at least one nutrition education course since the 7th grade, achieved the highest mean scores. The most striking finding however was the overall low knowledge scores achieved by the sample. Average scores were frequently below 50% correct. These findings suggest that repeated efforts to control weight is relatively common, particularly among females and that little success is achieved with any single attempt at weight control. Dietary habits and the existing weight loss activities among young people who are still maturing physically put them at risk for cardiovascular disease, cancer and other related illnesses as they grow and develop into adults. The school setting is probably the most efficient vehicle to children and adolescents. Recommendations for school based interventions are also discussed in this paper.

ATTITUDES OF UNIVERSITY EMPLOYEES FOR AN ON-CAMPUS WELLNESS/ HEALTH PROMOTION PROGRAM: RESULTS FROM THE WAYNE STATE UNIVERSITY SURVEY

S.P. Singleton, J.T. Fitzgerald, H.-J. Engels, and J.C. Wirth, Wayne State University, College of Education and University Health Center, Detroit, MI 48202

As American culture changes and becomes more interested in lifestyle improvement and self-care, many colleges and universities have begun to support and advertise health promotion/wellness programs on their campuses. The success of these programs is contingent on their ability to meet employees' needs and interests. An a-priori assessment can be an important tool for determining the type of health promotion activities that appeals most to employees and it may also serve to prioritize programmatic efforts. This paper describes the results of an assessment that was conducted to determine the feasibility of an on-campus wellness/health promotion program for employees at Wayne State University in Detroit, Michigan. Using the university payroll classification code system, the entire population of 4300 employees was surveyed in the Spring Semester 1990 to determine their attitudes for a university wellness/health promotion program. The results, which are based on 2401 survey respondents (56% response rate), indicate a strong interest among university employees for health promotion/wellness activities on campus. Specifically, frequency tabulation indicated that offering lunchtime (43%) and early evening (39%) activities was preferred over early morning hour activities (18%). Among program features, health screening services (e.g. blood pressure and cholesterol screening, body composition assessment, fitness testing; 40%) and exercise sessions (e.g. walk-jog programs; 36%) were found to be more popular than educational materials (e.g. fairs, lectures; 24%) to be offered as a first priority. Twenty-three percent of the employees surveyed indicated they hold a membership in a fitness/exercise center (e.g. YMCA, Vic Tanny). Chi-square analysis of responses revealed selected differences in terms of attitudes for an on-campus employee wellness/health promotion program depending on employment status (faculty/staff), educational level, income level, ethnic background, sex, and membership in a fitness/exercise club. Also, interest for a worksite wellness/health promotion program was negatively related to the distance employees had to travel in order to come to work. In general, findings of this study support previous research suggesting that university employees are strongly interested in worksite wellness/health promotion activities.

This study was supported by a WSU Research Stimulation Grant

THE EFFECTS OF MENSTRUAL CYCLE PHASE ON CARDIOVASCULAR REACTIVITY IN ORAL CONTRACEPTIVE USERS AND NON-USERS WITH A PARENTAL HISTORY OF HYPERTENSION

Carolyn M. Silvey and Roseann M. Lyle, Purdue University

Results of research examining the effect of menstrual cycle phase on cardiovascular reactivity in women have been inconsistent. Further research is necessary to establish if there is a need to control for phase variations in psychophysiological investigations and during diagnosis and treatment of women. The purpose of this study was to compare cardiovascular reactivity across two phases (follicular, days 7-11 and luteal, days 17-22) of a normal menstrual cycle in oral contraceptive users (OC) and non-users (NOC) with a parental history of hypertension. The degree of reactivity to stressor type (mental arithmetic or isometric handgrip) were also examined. Twenty (11 OC and 9 NOC) normally cycling, normotensive women (18-41 yrs) with at least one hypertensive parent reported to the laboratory two times per phase for blood pressure (BP) and heart rate (HR) measurements (once for baseline and once for the stress protocol in each phase). Trait anxiety was measured with a Cognitive and Somatic Anxiety Questionnaire during the first session, and State Anxiety was measured prior to each experimental session with a Subjective Units of Distress Scale. There were no differences between groups with respect to height, weight, age, and trait anxiety scores (OC Means = 64.5 in, 136.3 lbs, 23.8 yrs, 38.7 vs NOC Means = 63.5 in, 138.5 lbs, 24.7 yrs, 36.2). State anxiety also did not differ between the groups during any of the experimental sessions. Although the NOC had lower BP and HR than OC during baseline measurements in both phases, differences did not reach significance. For the remainder of the analyses, change scores (baseline values minus response values) were employed. A significant increase in BP ($p < 0.05$) was observed in response to the mental arithmetic task in both groups during both phases. HR response to the mental arithmetic task only reached significance in the OC during the luteal phase. The handgrip stressor resulted in a significant elevation of BP ($p < 0.0004$) in both groups during both phases. HR response to the handgrip task was significant for both groups only during the luteal phase. Although responses to the mental arithmetic task were more variable between groups than responses to the handgrip task, a 2 X 2 ANOVA (Group by Phase) on change scores demonstrated no significant main effects or interactions for either task. This study does not support the need to control for phase when performing psychophysiological studies or diagnostic testing in normally cycling women.

FACTORS INFLUENCING FAMILY CHOICE OF HEALTH CARE IN A DEVELOPING NATION.

Anna K. Harding, Rebecca J. Donatelle, Oregon State University.

In the U.S. as well as in developing nations, health care exists within a cultural milieu, and the provision of health education which affects health care choice and behavior is subject to cultural variations. Current evidence indicates that families in rural India do not have access to traditional and biomedical health services, and are severely affected by diseases that might easily be prevented or eradicated. The purpose of this research was to determine if the choice of family health care during illness differed according to demographic, socioeconomic, or cultural variables. Quantitative and qualitative data were obtained during interviews with 200 village women in South India, who served as proxies for their families. Village men and health care providers were also interviewed. The pretested, structured survey solicited (1) information about family members, (2) family use of health services during illness, and (3) opinions about the health care system. The results indicated that the choice of family health care differed significantly ($p>.05$) according to selected demographic, socioeconomic, and cultural factors. Although the private doctor was the preferred source of family health care in this area, differences were found between users and non-users of the midwife, the private doctor, and the government doctor with respect to the decision makers' ages and educational levels. Household use of care also differed according to family income level and caste category. Statistical methods included Chi-square, t-tests, and one-way ANOVA with Post-Hoc procedures. The value of soliciting information about health care preferences and educational needs is evident, as educators and researchers in the U.S. are evaluating progress toward the global goal of "Health for all by the year 2000". Providing health care and education for the increasing number of minority and foreign populations in the U.S. requires an assessment of potential cultural barriers that affect health choice and health status. It is therefore essential that health professionals acquire cross-cultural knowledge about health care decisions that are made in the context of larger social systems.

THE IMPORTANCE, FEASIBILITY, IDENTIFICATION, AND DESCRIPTION OF PROGRAM COMPONENTS IN EXISTING HEALTH PROMOTION/WELLNESS PROGRAMS AT PUBLIC SCHOOLS WITHIN THE STATE OF WISCONSIN.

Donna A. Champeau, University of Wisconsin-LaCrosse.
Richard Detert, University of Wisconsin-LaCrosse.

Selecting the most efficacious components of health promotion/wellness programs can be a difficult task for program coordinators. This situation is exacerbated in the public school setting where large numbers of potential offerings and vast differences in real and perceived district needs are often experienced. The purpose of this study was to: (1) determine the nature and description of existing health promotion/wellness programs in public school worksites in Wisconsin, (2) determine those programs that program coordinators perceived to be most important in the public school worksite, and, (3) determine the actual feasibility of health promotion/wellness programs, based upon perceived barriers/constraints described by health promotion/wellness coordinators. Participants in this study consisted of 48 program coordinators and 45 persons affected by programming efforts in 52 Wisconsin public school districts. These individuals participated in the development of a three round Delphi technique designed to elicit essential information about program components, and perceptions about the importance and feasibility of various components. Round one of the Delphi process resulted in the development of a descriptive listing of existing program components. Rounds two and three of the Delphi process allowed respondents to rate the importance and feasibility of program components based on an open-numbered Likert-Type scale. Program components were ranked by z-scores following round three, with a z-score of .43 and above used to determine those components perceived as being most important and most feasible. Program components identified as most important included participant health screening and risk assessments, employee assistance programs, and exercise and fitness programs. While the preceding were believed to be most important, health screening and risk assessment, and first aid/CPR were the major components that coordinators believed to actually be most feasible. These findings provide essential information for professionals contemplating development of school-based health promotion programs in the future.

THE DEVELOPMENT OF COMPUTER APPLICATIONS IN HEALTH: PAST AND FUTURE TRENDS. Tricker, R., Oregon State University; Miller, C., Kansas Department of Personnel Services; Donatelle, R., Oregon State University.

During the 1980s much was written about the evolving computer technology for health education and health promotion (Pruitt, Gilbert, Gold, 1983; Duryea, 1983; Scanlan, 1986). Today the trend continues and closer attention is needed to examine the degree to which the new computer technology is developing to meet the needs of the health education profession and the public it serves. The purpose of this study was to elicit the opinions of experts in comparing the past and future trends in the development of computer applications. The seventy health professionals who participated in the study had been selected as participants in the Campbell's Institute for Health and Fitness. The Health Promotion Predictions Inventory (HPPI) was used to collect the perceptions of the experts in relation to the question, "To what degree has the computer assisted health professionals in performing their duties?" Based on comparisons derived from the experts' perceptions the results of the study predicted significant increases (p .001) in computer utilization for evaluating program outcomes; storing and analyzing data; targeting high risk populations. The implications of the study centered upon the need to consider trends in computer development particularly in relation to selection, cost and compatibility of software, evaluating the cost/benefit ratio of using computers, and the potential benefits of use vs. loss of human potential.

HEALTH KNOWLEDGE, ATTITUDES, AND PRACTICES OF SEVENTH GRADE STUDENTS IN SOUTH CAROLINA

Ann C. Slater, University of North Carolina at Charlotte

The purpose of this study was to determine the relationship, if any, between the status of South Carolina seventh graders' health related knowledge, attitudes and self-reported practices and three variables: (1) students' socioeconomic status, (2) their teachers' health education preparation, and (3) the type of health education program in which the students were enrolled during the 1987-88 school year. There was a significant need for this study because no comprehensive health education assessment had ever been conducted in South Carolina, and baseline data were needed prior to the state's 1988-89 implementation of the Comprehensive Health Education Act. A stratified random sample of schools from five socioeconomic status groups was selected. Within each school, the principal identified one class of average seventh grade students. The final sample included 76 schools (each representing one classroom and the teacher who had taught health to the majority of the students in that classroom). This sample included schools from 49 of 91 of the state's school districts and 1,604 public school students. Calculation of nine separate one-way analyses of variance (ANOVA) and the F-ratio for each ANOVA demonstrated that there were no statistically significant relationships between students' levels of health knowledge, attitudes and self-reported practices and their schools' socioeconomic status, their health teachers' preparation, and the health program of their school. When compared with seventh grade students who had been tested with the same instruments during the 1985 national School Health Education Evaluation (SHEE), the South Carolina students exhibited lower scores for knowledge, attitudes, and practices (Z-scores of -7.99, -2.28, and -4.25, respectively). The findings of this study demonstrate that seventh grade students were not being taught comprehensive health education (CHE) programs prior to enactment of the South Carolina Comprehensive Health Education Act even though the state provided comprehensive textbooks and mandated instructional time for health education. Findings also suggest that CHE alone is not likely to significantly improve the health status of school aged children. Recommendations call for full implementation of CHE as part of an expanded school health program which includes integrated instruction with other content areas and which involves parents, community, and media representation.

PROFESSIONAL PREPARATION CURRICULUM FOR CORPORATE HEALTH PROMOTION: AN EVALUATION BY ENTRY LEVEL PROFESSIONALS

Catherine Kennedy, Colorado State University.

The purpose of this study was to investigate the professional skills necessary for individuals entering corporate wellness positions as perceived by recent graduates in entry level positions. A survey was developed which contained a list of content areas recommended for professional preparation programs by the Association for Fitness in Business (AFB) and the Xerox Health & Fitness Professional Competencies List. The instrument was mailed to a random sample of 200 companies that offer on-site Health / Fitness Programs. The survey was sent to the director of the program who was then asked to forward the survey to any employee in the health / fitness program that had completed a bachelors degree within the past five years in an appropriate professional preparation curriculum. Each subject was asked to rank each content area on a five - point Likert - type scale (1 = Very Important, 5 = Not Important). Of the 200 surveys mailed to corporate health / fitness directors, 127 usable surveys were returned with a response rate of 63.5%. The six content areas perceived to be of critical importance to individuals entering corporate health / fitness programs were: Motivating Human Behavior, M = 1.21; Program Planning, M = 1.47; Evaluation Procedures, M = 1.48; Marketing, M = 1.50; Interpersonal Communication, M = 1.51 and Exercise Prescription, M = 1.55. The six content areas considered to be of least importance to the entry level professional were: Statistics, M = 2.34; Budgeting and Fiscal Management, M = 2.51; Aging / Gerontology, M = 2.77; Business Management, M = 2.78; Safety, M = 2.85 and Occupational Health, M = 2.87. More than half (68%) of the respondents felt that professional preparation programs must include more extensive clinical or practicum experience prior to graduation. The results of this study reinforce previous investigations of necessary content areas as perceived by corporate directors of health / fitness programs. In most instances, it appears that professional preparation programs are focusing on the practical needs of individuals entering the corporate health field. It remains to be an important issue that professional preparation programs re-examine their emphasis of required and elective coursework to meet the needs of the corporate sector in health promotion. In addition, the positive feelings toward undergraduate clinical experience must also be addressed.

DIFFERENCES IN BLOOD PRESSURE: LONGITUDINAL STUDY OF A CHILDHOOD POPULATION.

J. Gough and C. Westerfield, Area of Health and Human Performance Studies, The University of Alabama.

Hypertension remains a prevalent risk factors in cardiovascular disease affecting both adult and pediatric populations. Previous research has established gender, race and body composition as some of the risk factors that influence blood pressure differences in various populations. Research has not been consistent when examining these factors in pediatric populations. The purpose of this study was to compare race and gender blood pressure and skinfold differences among a cohort of public school students after a nine year period. Data from tenth grade students (N=353) who had been subjects in the study as first graders were utilized. Two-way ANOVA was utilized to compare mean values for systolic and diastolic, height, weight, and skinfolds between sex and racial subgroups. Pearson's correlations determined the relationship of body weight and skinfolds to blood pressures in the first and tenth grade samples. Results indicated significant sex differences (p<.01) for height, weight, systolic and diastolic and skinfolds for both the first and tenth grade samples. Males were greater on all variables except total skinfolds. Among the cohort of first graders, blacks were significantly taller and heavier than whites, while whites had significantly higher skinfolds. There were no significant differences between racial subgroups and blood pressures. In tenth graders the only significant racial difference was that blacks had higher systolic blood pressure. Weight was significantly positively correlated with systolic and diastolic in both first and tenth grade samples. Skinfolds were significantly positively correlated (p<.01) with systolic and diastolic among first graders and with only diastolic among tenth graders.

DEMOGRAPHIC DETERMINANTS OF SEATBELT USE FROM THE BRFSS DATA.

James E. Eddy, University of Alabama;
Catherine A. Teare Ketter, Georgia College;
Barbara M. Barker, University of Alabama; Eugene Fitzhugh, University of Alabama.

The purpose of this study was to examine the relationships among selected demographic variables and seatbelt use. BRFSS data for 32 states were used for this study; the composite of all observations for each state was considered a single observation. Criteria for inclusion were the presence of current mandatory seatbelt legislation in 1987, participation in the Behavioral Risk Factor Survey (CDC) in 1987, and some type of public awareness program focusing on seatbelt use. State with missing values for one or more of the variables used the most appropriate measure of central tendency as a substitute for the missing variable. A Principal Components Analysis (PCA) followed by varimax rotation was performed on the correlation matrix, six significant factors were retained for rotation. Examining the rotated factor structure, eight significant variables emerge on the first component: Race, the type of enforcement used to support mandatory seatbelt use, the number of licensed drivers in the state, and five income variables. Factor 2 is best described by five variables with significant loadings: two income variables, a BRFSS seatbelt use variable, the length of time, in years, since the enactment of initial mandatory restraint legislation in 1987, and the type of law enforcement in place in 1987. Factor 3 is a composite of three significant variables: number of annual citations for failure to comply with mandatory use in 1987, the level of enforcement (primary or secondary), and the length of time, in years, since the passage of updated seatbelt use legislation. Dollar amount spent on public awareness programs in 1987, and the ratio of the number of licensed drivers to program dollar amount describe Factor 4. Factor 5 contains three significant variables: a middle income variable, the ratio of the number of licensed drivers to program dollar amount, and the length of time since the passage of additional mandatory use legislation. Factor 6 is a gender/high income variable described by those two variables. In summary, these components present a hierarchical grouping of variables which are determinants of seatbelt use; income, race, type of enforcement, and the number of licensed drivers emerge as the most important variables in describing patterns of seatbelt use.

HEAVY CONSUMPTION OF ALCOHOL. IS THERE A RELATIONSHIP BETWEEN THIS AND DEPRESSION, LACK OF SOCIAL SUPPORT, AND CONSIDERATION OF SUICIDE?

Cheryl A. Graham, Richard K. Gibbs, Oregon State University.

The consumption rate of alcohol in our institutions of higher learning is alarmingly high. It is estimated that 50% of the college population has some type of problem with alcohol, ranging from poor academic progress, to death from an overdose. Alcohol is not the only factor that causes problems on our campuses; there is also a significant number of individuals who are depressed, lack a social support system, or are suicidal. A study was done to determine if there was a significant relationship between individuals who consider themselves to be "heavy drinkers," and those who exhibited feelings of depression, lack a social support system, or had considered suicide. The data were collected at a large northwestern university during the fall and winter quarters in an obligatory PE/Health class. A population of over 1,600 students was administered a paper/pencil health risk analysis (HRA) program entitled "The College Wellness Check". The dependent variable in this study was those students who consider themselves heavy drinkers. The independent variables were depression, a lack of a social support system, and a consideration of suicide. Alpha was set at .05, and a multiple regression statistical analysis was used to determine if a significant relationship existed between the aforementioned variables. The data analyzed did indicate a significant relationship between the dependent and independent variables. The importance of a significant relationship between these variables is that the findings can be used in intervention strategies, in educational settings, alcohol help programs (ie. Alcoholics Anonymous) and other university settings where the health and welfare of students is seen to be important. Proper measures can then be taken to educate these students on the effects of heavy consumption of alcohol combined with the common variables of depression, a lack of a social support system, and a consideration of suicide.

A Longitudinal Examination of Teacher Burnout

Stephen Nagy & M.Christine Nagy, The University of Alabama

The purpose of this study was to determine whether rates of teacher burnout are constant or fluctuate over time. Most studies of teacher burnout have to date, utilized one-time analyses. Teachers in a school district were administered the Maslach Burnout Inventory (MBI) during the springs of: 1983 (N=610), 1986 (N=466) and 1988 (N=566). Data were coded and categorized according to MBI specifications. Scores were computed for emotional exhaustion, depersonalization, and personal accomplishment on frequency and intensity scales for each of the three variables. Pearson correlation coefficients showed strong relationships (r=.58 to r=.80) between frequency and intensity scales among the variables. Emotional exhaustion and depersonalization scales also showed strong relationships (r=.58 to r=.64). Based on the strength of the relationship between depersonalization and emotional exhaustion and among the frequency and intensity scales, reporting of the data focuses on emotional exhaustion and personal accomplishment on the frequency scales. Burnout theory advances that burnout occurs in individuals and groups who experience high rates of fatigue in conjunction with low rates of success/accomplishment. Following this model, teachers with high emotional exhaustion and low personal accomplishment were classified as burnout out. Percentages of teachers meeting these criteria for burnout were 4%, 13%, and 12% respectively across the three time waves. Examination by grade level of instruction indicated scores of 4%, 9% and 9% for senior high school teachers, 7%, 7% and 11% for junior high school teachers and 8%, 16% and 19% for elementary school teachers. Indications are that rates of burnout fluctuate over time and vary by grade level taught. Interventions directed toward teacher burnout need to consider grade level taught and are probably most cost-effective if directed toward elementary school teachers. Since burnout rates vary by time it is important to establish norms across time and across settings. This should assist in determining high risk groups deserving of interventions.

RELATIONSHIP BETWEEN SELECTED PSYCHOSOCIAL FACTORS WITH QUALITY OF LIFE AMONG HEART TRANSPLANT RECIPIENTS: IMPLICATIONS FOR THE HEALTH EDUCATOR.

Dalen M. Duitsman, Charles M. Cychosz, Iowa State University; Mohammad R. Torabi, Indiana University, Bloomington.

This study investigated the psychosocial variables that significantly influence quality of life in heart transplant recipients. A total of 132 heart transplant recipients from five different Midwestern transplant centers completed the instrument. The questionnaire consisted of the Adult Self-Image Scale and Family Well-Being Summary Scale (Simmons, Klein, and Simmons 1977), the Body Satisfaction Scale (Bohrnstedt 1977), and the Quality of Life Indicators (Campbell, Converse, and Rodgers 1976). Questionnaires were either mailed or administered during clinic visits. Alpha coefficients ranged from .74 to .91 for the majority of the psychosocial scales. Exceptions were the measures of independence versus dependence, anxiety, and identity stability which displayed alpha coefficients of .47, .58, and .69 respectively. The alpha coefficient for the quality of life indicators was .92. A stepwise multiple regression analysis revealed that high self-esteem (B=.24, t=4.31, p=.000), low depression (B=.35, t=3.37, p=.001), high body satisfaction (B=.35, t=1.9, p=.060), and high satisfaction with family relationships (B=.22, t=5.2, p=.000) were associated with a high quality of life (F=72.14, R^2=.75, p=.000). Partial F-tests revealed depression (F=11.34, p=.01), self-esteem (F=18.63, p=.001) and satisfaction with family relationships (F=26.90, p=.001) as primary influences when controlling for the other psychological factors. These findings suggest the influence of three domains on quality of life. Satisfaction with family relationships appeared to be a fundamental determinant of quality of life. For the heart transplant recipient this impact may be mediated by self-esteem and depression. Intervention strategies should address these three domains when attempting to optimize the heart transplant recipients quality of life. Programming that addresses the psychological and physical effects of transplant protocol and capitalizes on strategies that enhance self-esteem, lower depression, and facilitate family effectiveness would seem to be appropriate. As heart transplantation increases in prevalence, health educators will inevitably be confronted with heart transplant recipients in the classrooms, workplace, and community. These are important venues for health education. Understanding the unique aspects of heart transplant recipients will be essential in assisting this population in reaching their full potential.

EFFECTS OF ITEM DEPENDENCY ON IRT PARAMETER ESTIMATION FOR THE BINOMIAL TRIALS MODEL.

Marilyn A. Looney, Northern Illinois University, and Judith A. Spray, American College Testing.

Many item response theory (**IRT**) models were developed originally for mental tests which present multiple, written test items to an examinee who then is given a single attempt at answering each item correctly. Several psychomotor skills tests, however, consist of multiple attempts of the same item (**MASI**). The appropriateness of the Binomial Trials Model for this type of data needs to be determined because the presence of learning or fatigue effects in such tests may violate the model's assumption of local independence. Therefore, the purpose of this study was to determine what effect the severity of the violation of local independence (**VLI**), coupled with different sample size (**SS**), test length (**TL**), and test difficulty (**TD**), has on the estimation of the model difficulty parameter, *b*, using computer simulation techniques. Each of the following conditions was replicated 100 times under a completely crossed design: **SS** (100, 200, 500, 2000); **TL** (5, 10, 20, 25 attempts); **TD** (*b* | -1.2, 0.0, 1.2); and **VLI** (from no violation to complete violation). Examinee ability or latent trait was pseudorandomly drawn from a standard normal distribution, and the *b*-parameter was estimated using a maximum likelihood procedure on generated test scores. Regardless of **SS**, **TL**, and **TD** the *b*-parameter tended to be overestimated for situations in which the **VLI** condition simulated fatigue. In other words the test appeared to be more difficult than the nominal value of *b* would imply, which was logical and expected. What was somewhat unexpected, however, was that the magnitude of the bias in the *b* estimates did not shrink as sample size increased, and it decreased only slightly as the test length increased. The opposite effect was observed when the **VLI** condition simulated late-test learning. The test difficulty was underestimated so that the test appeared to be easier than the nominal level of *b* would assume. Once again, an increase in sample size had no effect on this magnitude of the bias in the estimates of *b*. The implication of these and other findings suggest that violations of local independence, at least as simulated in this study, could seriously bias the difficulty parameter estimates if all examinees tested exhibited the dependency. Further work should investigate the bias that occurs if less than 100% of the examinees exhibit the dependency, which would be more realistic in most testing situations.

THE CALIBRATION OF A SIT-UP TASK USING THE RASCH POISSON COUNTS MODEL.

Weimo Zhu, Wayne State University; Margaret J. Safrit, University of Wisconsin-Madison

Almost all psychomotor test scores are calibrated using classical test theory (CTT). The disadvantages of CTT include sample dependence, item dependence and different metrics for estimating examinees' abilities and calibrating task difficulty. These problems can be eliminated by applying item response theory (IRT). The purpose of this study was to calibrate a nationally used sit-ups using the Rasch Poisson Counts model, an one-parameter IRT model, and evaluate the goodness of fit between the model and the data. Scores on the modified sit-ups test used in the National Children and Youth Fitness Study (NCYFS I) were employed. The total number of subjects was 8723, with 4486 girls and 4237 boys, ages 10 to 18. The calibration was accomplished by MASI, a computer program written for the Poisson model. A marginal maximum likelihood estimation procedure was utilized for the simultaneous estimation of ability and item parameters. The model-data fit was evaluated by the Kolmogorov-Smirnov (K-S) test. The estimated difficulty of the sit-up task was -2.80, with a small standard error of estimation (SE=0.003). The item difficulty was appropriate for a majority of examinees, whose ability levels ranged from .09 to 1.39. The average ability was .644 for girls and .827 for boys. The boys had a slightly smaller standard deviation (SD=.30) than girls (SD=.33). The average ability levels varied across age groups (.59 to .82). The difficulty of the sit-ups task seemed appropriate for both girls and boys, and for different age groups. After the calibration, boys and girls as well as different age groups were compared under the same metric. The maximum deviation observed in conducting the K-S test was 0.5557, which led to rejection of the hypothesis that the model fit the data. This result must be interpreted with caution because of the large sample size employed. Graphs of the model-data fit demonstrated that the model-data fit at low ability level was not as good as the fit at high ability. The Poisson model assumes that examinees' performances have the same average speed throughout the test and the performance speed at a given time is independent of the number of sit-ups completed so far. These two assumptions were likely violated because of the examinees' fatigue. The unsatisfactory model-data fit obtained in this study could be caused by these assumption violations. The application of the Poisson model to sit-ups data is limited to date. Further study to determine the effects of fatigue, which is a factor in most time-limit psychomotor tests, on the model should be conducted.

THE UTILITY OF ITEM RESPONSE THEORY IN EVALUATING MASTERY CLASSIFICATION OF DICHOTOMOUSLY SCORED PSYCHOMOTOR SKILL DATA.

Emily L. Cole, Indiana University, Terry M. Wood and John M. Dunn, Oregon State University.

The purposes of this study were to (a) examine the feasibility of item response theory (IRT) for evaluating mastery classification cut-off scores of dichotomously scored psychomotor data, (b) compare the degree of agreement between classical test theory (CTT)-derived and IRT-derived mastery classification scores, and (c) determine the cut-off scores most precisely measured by the Test of Gross Motor Development (TGMD) (Ulrich, 1985). Data collected by Ulrich in the original analysis from 893 nonhandicapped and 20 mildly mentally handicapped children aged 3-10 years were used in this study. Since IRT cannot provide accurate estimates of ability for subjects displaying 0% or 100% mastery, 32 subjects (3.5%) were removed from the data set. CTT statistics and IRT parameters were computed for each TGMD subtest using the PC-BILOG computer program (Mislevy & Bock, 1986). IRT parameters were computed for the two-parameter logistic model because it provided the best fit to the TGMD data. For each TGMD subtest, cut-off scores representing 70% and 85% mastery were computed from both CTT raw test scores and IRT ability estimates. Contingency coefficients were used to compare the agreement between the two theories with IRT serving as the "true" score. The two theories showed a high degree of agreement in classifying masters and nonmasters at the 70% and 85% mastery levels for both the locomotor and the object control subtests. The locomotor contingency coefficients were .93 and .99 for the 70% and the 85% mastery levels, respectively. The object control subtest revealed higher coefficients of .99 and .997 for the 70% and the 85% cut-offs, respectively. Although the agreement statistics were high, IRT more frequently classified those subjects close to the cut-off score as nonmasters where CTT classified them as masters. Moreover, IRT displayed more precision in making mastery classification decisions because of the superior metric of ability scores (i.e., better discrimination properties). The second part of evaluating the validity of the mastery classification score was to determine the cut-off score most precisely measured by the TGMD. IRT information functions were generated for each subtest. The locomotor subtest was most precise at a true score of 7.7 (out of 26 items) which represents 30% mastery and low ability (theta = -1.857). The object control subtest provided the most information at a slightly higher ability level (theta = -1.643) which reflected a true score of 8.5 (out of 19 items) and a mastery level of 45%. This finding supports the use of the TGMD for classifying individuals of low gross motor ability. The results of this study provide evidence that (a) IRT can be effectively used in assessing mastery classification cut-off scores of psychomotor data and (b) the TGMD best classifies individuals of low gross motor ability.

THE RELIABILITY OF THE MILE, 3/4 MILE, AND 1/2 MILE DISTANCE RUN TEST FOR CHILDREN GRADES K - 4. Roberta E. Rikli, California State University, Fullerton; Clayre Petray, California State University, Long Beach; Ted A. Baumgartner, University of Georgia, Athens.

Nationwide, increased attention is being given to fitness instruction and fitness testing in the lower elementary grades. For the first time, AAHPERD (Physical Best, 1988) has included grades K-4 in its testing program. However, almost no research exists regarding the practicality or reliability of the various test items for this age group. In particular, there is concern as to which distance is most appropriate for the run/walk test for these ages. The purpose of this research was to conduct test-retest reliability studies in grades K-4 for the one mile run/walk test described in Physical Best, as well as for alternative 1/2 mile and 3/4 mile distances. Over [illegible] students in 51 different classes (K-4) were randomly assigned, by class, to either the mile, 3/4 mile, or 1/2 mile distance run conditions. The study was conducted in eight different schools in an ethnically mixed district in southern California. Physical education classes were taught by physical education specialists one day a week and by classroom teachers twice a week. Students received instruction on the purpose and goals of fitness testing and were given one practice trial prior to the official test-retest sessions. Tests were administered, one week apart, by the physical eduation specialist both in the fall (October) and again in the spring (April). The total number of students completing the tests was 1,179, representing 30 different treatment/sex/grade level groups ranging in size from 32 to 65. Reliability was computed using the intraclass correlational analysis appropriate for estimating reliability of scores collected on one day (Baumgartner and Jackson, 1991). Results indicated that the one-mile distance run scores had acceptable reliability (.83 -.90) for both boys and girls in grades 3 and 4, and minimally acceptable reliability for grade 2 (boys = .70; girls = .77). The alternative 3/4 mile and 1/2 mile scores in grade 2 were inconsistent across sexes, with the reliabities for boys being .82 and .73, respectively, and for girls .68 and .76. In kindergarten and grade 1, only the 1/2 mile distance met minimal reliability standards (> .70) for either boys or girls. No meaningful or consistent changes occurred from fall to spring in reliability values for any of the test conditions. With respect to test reliability, results of this study support use of the mile run for boys and girls in grades 3 and 4, use of the 1/2 mile run for boys and girls in grades K and 1, but are inconsistent regarding the preferred distance for grade 2. In addition, instructor subjective evaluations (via a questionnaire) were analyzed relative to feasibility, recommendations, and perceived value of the alternative distance run tests in grades K-4.

VALIDITY AND RELIABILITY OF THE 20 METER SHUTTLE TEST IN AMERICAN FEMALES 19-34 YEARS OF AGE.

Rene LaMontagna, Vincennes University; Dr. Tom Ball, Northern Illinois University

The purpose of this study was to determine the validity and reliability of the 20 Meter Shuttle Test (20MST), and to examine the importance of body fat in predicting maximum oxygen consumption (VO_2 max) from 20 MST results in American females. Subjects were 41 females, 19-34 years of age, who were students at Northern Illinois University or living in the local community. Two trials of the 20MST and a maximal treadmill test were completed by all subjects within a two week period. Height, weight, age, and sum of skinfolds (triceps, suprailiac, and thigh) were also recorded. Intraclass reliability coefficients were R = .92 for lengths completed and R = .92 for maximal speed obtained, with trial two eliciting significantly higher values for both lengths completed and maximal speed obtained. The following regression equations were developed to estimate VO_2 max ($ml \cdot kg^{-1} \cdot min^{-1}$) from the second trial of the 20MST measured in lengths completed (Lengths) and maximal speed obtained (Speed);

$$y = .262\ (\text{Lengths}) + 25.49\ (r = .76,\ \text{SEE} + 4.00\ ml \cdot kg^{-1} \cdot min^{-1})$$

$$y = 4.95\ (\text{Speed}) + 14.06\ (r = .71,\ \text{SEE} + 4.30\ ml \cdot kg^{-1} \cdot min^{-1})$$

Sum of skinfolds, body weight, height, and age did not contribute significantly to the regression equations. The results of this study suggest that the 20MST may be a reliable and valid method of estimating aerobic fitness in females 19-34 years of age. Such information is of practical importance to physical educators because the 20MST can be done on a large number of subjects at one time, can be done indoors so subjects can be tested during inclement weather, is paced by external auditory signals, and is progressive and maximal in nature.

SITUATIONAL ANXIETY IN SPECIAL OLYMPIC ATHLETES

David L. Porretta, The Ohio State University; William Moore, East Carolina University, Connie Sappenfield, Coordinator of Special Populations and Special Olympics, Greenville, NC.

Previous research has found that mildly mentally handicapped (MMH) persons typically possess higher levels of situational (state) anxiety in a competitive sport setting as compared to nonhandicapped persons (Levine & Langness, 1983). The purpose of this study was to further explore situational anxiety (practice and competitive) in Special Olympic athletes participating in local track and field events. Thirty-nine MMH athletes (26 males and 13 females) with a mean chronological age (CA) of 14.5 years, a mean mental age (MA) of 11.2 years, and a mean I.Q. of 63.4 served as subjects. The State Subscale of the State-Trait Anxiety Inventory for Children (STAIC) also known as the "How I Feel Questionnaire" (Spielberger et al., 1973) was used to measure anxiety. A pilot study was conducted to determine the appropriateness of the instrument. Subjects were administered the self-report questionnaire by coaches on three separate occasions, twice during two consecutive practice sessions and once on the day of competition. A test-retest administration of the subscale on two separate practice sessions resulted in a correlation of .81 (males = .78; females = .87). These values are much higher than those originally obtained by Spielberger et al. with nonhandicapped children of similar MA. In addition, a nonsignificant, ($p > .05$), low correlation ($r = .34$) was obtained between I.Q. and state anxiety. It was found that subjects exhibited only slight increases in anxiety on the day of competition ($M = 32.7$) when compared to a practice situation ($M = 31.6$). In order to compare anxiety in a practice as opposed to a competitive environment, a Wilcoxon Matched Pairs Signed-Rank Test was performed. This nonparametric test was performed because the STAIC produces a limited range of scores. Results of this test were not statistically significant ($p > .05$). Results of Fisher's exact test revealed that slight increases in competitive anxiety neither helped nor hindered performance on each of the following events: softball throw for distance, standing long jump, 50m, 100m, 200m, and 400m dashes. Fisher's exact test was used over other Chi Square solutions since cell sizes were considered small. Results do not coincide with those of Levine & Langness (1983), and suggest that at local levels MMH subjects do not seem to experience excessive competitive anxiety which would negatively effect performance. One explanation for this may be due to subjects perceiving Special Olympics track and field events as non-competitive or non-evaluative in nature.

EFFECT OF POSTURE ON PEAK EXERCISE HEMODYNAMICS OF QUADRIPLEGICS. Stephen F. Figoni, Satyendra C. Gupta, Agaram G. Suryaprasad, & Roger M. Glaser. VA Medical Center and Wright State University School of Medicine, Dayton, OH.

Traditionally, the upright posture has been used for arm-crank exercise testing and training of spinal cord injured (SCI) quadriplegic subjects, even though orthostatic stress associated with upright posture may induce lower-body venous pooling and impair central hemodynamic function. The purpose of this study was to compare central hemodynamic responses of quadriplegics during maximal-effort arm-crank exercise in the upright sitting and supine postures. Eleven SCI quadriplegic subjects performed graded arm-crank exercise tests from rest to maximal effort using an electronically braked ergometer. The order of tests in each posture was balanced among subjects. Physiologic responses were determined with open-circuit spirometry, impedance cardiography, and auscultation. Data were analyzed with repeated measures analysis of variance. Compared with tests in the sitting posture, supine tests elicited significantly ($p<.05$) higher peak values of power output (35 vs. 47 W), oxygen uptake (0.74 vs. 0.93 $L \cdot min^{-1}$), cardiac output (6.91 vs. 8.89 $L \cdot min^{-1}$), stroke volume (59 vs. 72 $ml \cdot beat^{-1}$), and myocardial performance (estimated from the ratio of the pre-ejection period to the left ventricular ejection time, 0.392 vs. 0.293). Calculated total peripheral vascular resistance during peak exercise was significantly lower (11.9 vs. 8.5 $mmHg \cdot L^{-1} \cdot min^{-1}$) in the supine posture. No significant differences were observed between postures for peak heart rate (118 vs. 124 $b \cdot min^{-1}$) and mean arterial blood pressure (82 vs. 76 mmHg). These results suggest that, for quadriplegics, the supine posture may provide hemodynamic advantages by promoting venous return, cardiac preload, cardiac output, and greater arm exercise capacity than in the traditional upright sitting posture. Therefore, cardiovascular and aerobic training may also be more effective for quadriplegics in the supine posture due to the higher cardiac volume-load and aerobic metabolic rate that it can generate. Given the presence of myocardial sympathetic impairment secondary to cervical SCI, the lower total peripheral resistance, enhanced venous return, and the Frank-Starling mechanism are probably important factors contributing to the improved central circulatory responses during supine exercise. The ability to increase peak cardiac output during supine exercise above that for upright exercise suggests that peak oxygen uptake is limited more by peripheral factors such as venous pooling/return than by central cardiac factors such as myocardial performance. Finally, discretion is advised in labelling as "maximum" the highest physiologic responses measured for quadriplegics during upright arm exercise since the supine posture may allow higher peak values of power output, oxygen uptake, and cardiac output. (Supported by the Rehabilitation Research and Development Service of the U.S. Department of Veterans Affairs.)

EFFECTS OF A REINFORCEMENT-BASED EXERCISE PROGRAM ON SELECTED FITNESS PARAMETERS AND WORK PRODUCTIVITY IN ADULTS WITH MENTAL RETARDATION. **Ron Croce, University of New Hampshire; Michael Horvat, University of Georgia**

Although the effects of exercise on the physical fitness of individuals with mental retardation have been demonstrated, few studies have empirically investigated the effects of exercise on worker productivity (work performance), with no study assessing retention of fitness levels and work performance after treatment termination. Since researchers have demonstrated that individuals with mental retardation perform substantially lower on physical and motor skills when compared to their nonretarded peers and since they are most typically required to use motor rather than cognitive skills in the work place, employment success can be enhanced with improved physical capacities. Verification of the link between physical conditioning programs and improvements in job-related skills can significantly enhance the rationale for adapted physical education in the public schools. The lack of empirical research demonstrating such a relationship prompted the present study. It was the purpose of the present study to empirically determine the effects of a reinforcement-based exercise program on the cardiovascular fitness (predicted max VO_2 in ml/kg/min), strength (composite isometric strength scores in kg of force), and work performance (pieces of work completed on a job-related task) in three adult males with mental retardation. Treatment consisted of a 1-hr aerobic and resistance exercise program 4-days per week. A multiple-baseline across subjects design was employed to evaluate treatment effectiveness and maintenance of treatment on the previously mentioned variables. Additional subject data were gathered on percent increases on each of the dependent measures. A visual inspection of the data and a celeration line statistical analysis technique indicated subjects improved from their baseline scores on all measurements ($\underline{p} < .05$) and these improvements were maintained above baseline measures 5-weeks posttreatment. Results indicated that adults who are mentally retarded respond to a progressive aerobic and resistance exercise program much the same way as their nonretarded peers and that increases in strength and cardiovascular fitness can facilitate job performance. Issues relating to program effectiveness, percent increases in the dependent measures, and the importance of physical activity programs for individuals who are mentally retarded are discussed.

A COMPARISON BETWEEN ANTHROPOMETRIC REGRESSION EQUATIONS AND HYDROSTATIC WEIGHING FOR PREDICTING PERCENT BODY FAT OF ADULT MALES WITH DOWN SYNDROME

Steven E. Ovalle, Oregon State University; Emily L. Cole, Indiana University; Michael Climstein, John M. Dunn, Oregon State University

For the individual with Down Syndrome (DS) obesity is a health risk and a second handicap. This dual handicap reduces access to opportunities for social interaction with non handicapped peers. Individuals with DS are being classified as obese and non obese. Obesity reduction programs are being developed using methods of measuring obesity that have shown poor validity among the non handicapped population and which have yet to be validated among the DS population. Body fat percentages were predicted for 18 adult males with DS. Skinfold, circumference and bioelectric impedance analysis data were collected to determine how accurately eight existing regression equations could predict the percent fat of these individuals when compared to the data obtained from hydrostatic weighing (HW). Two pilot studies, using four subjects, were conducted. The first to determine if a constant value of residual volume (RV) could be used during HW or if a measured value, determined by oxygen dilution, needed to be used. The second to determine if hydrostatic weighing total lung capacity head not submerged (HWTLCHNS) or the conventional method could be used as the criterion measure. Paired t-tests revealed no significant differences in either study, $r=.998$, $SE=.352$, and $r=.998$, $SE=.575$, $p < .05$ respectively. Based on these results a constant RV of 1.50L and the HWTLCHNS method were used in the main study. A repeated measures one way analysis of variance revealed a significant difference between the data obtained from HW and the regression equations, $F(8, 136)=16.05$, $p < .05$. A Dunnett's post hoc revealed significant differences in five of the eight equations. Of the three equations that were not significantly different only one, Kelly and Rimmer (1987), $r=.889$, $SEE=2.51$, $p < .05$ can be recommended for use by both the researcher and the practitioner when predicting percent fat of adult males with DS. Based on these results it appears that a constant RV and HWTLCHNS can be used when predicting percent fat from HW. This will allow increased numbers of individual's with DS to be hydrostatically weighed. The use of the Kelly and Rimmer (1987) equation will allow researchers and practitioners to use an easy, fast, accurate and inexpensive method to predict the body fat percent of adult males with DS.

SEGMENTAL ACCELERATION PATTERNS OF ELITE WHEELCHAIR PROPULSION

Carol J. Pope, Texas Christian University, and
Jerry D. Wilkerson, Texas Woman's University

Researchers have reported that there is a need for biomechanical research investigating the underlying processes involved in wheelchair propulsion (van der Woude, Veeger, and Rozendal, 1989). The purpose of this study was to investigate the segmental acceleration patterns of propulsion used by elite wheelchair athletes. The problem of the study was to determine (a) if there is a pattern of acceleration that is identifiable in the upper extremities in wheelchair propulsion, (b) if any pattern is identified with faster wheelchair velocity, and (c) if the patterns change as a result of time. Data were collected at the Southwest Wheelchair Athletic Association Regional Track and Field Meet in April, 1990. Ss were 10 male competitors who participated in the 1500 m Goodwill Games trials held in conjunction with the meet, or in the 1500 m event of the regional competition. All Ss had an amputation or spinal cord injury. Data were collected using a Panasonic high speed shuttered video camera with 1/1000 shutter factor operating at 30 fps. The camera was on a tripod in a position to obtain the left sagittal view of the racers during each lap of the race. A full propulsion/recovery stroke cycle was recorded for each S during each competitive lap of the race. Variables included (a) relative wheelchair velocity, and (b) absolute segmental velocities and accelerations of the upper body (upper arm, forearm, hand, and trunk). Video recordings were viewed using a Panasonic VCR interfaced to an 80286 computer. A Freeze Frame card was used as the video frame grabber. The Kansas State University Film Analysis System (Noble, Zollman, and Yu, 1988) was used for data reduction and analysis. Data were smoothed using a second order recursive Butterworth digital filter set proportionally to sample size. Findings indicated that identifiable acceleration patterns did exist. The contribution of the trunk in increasing wheelchair velocity during the final portion of the recovery phase was verified. Additionally, the identified acceleration patterns did change as a result of time. Maximum segmental acceleration decreased from the initial to the last lap of the race. Qualitative variations in style also existed across subjects. Results from this study will be used in further analyses of segmental patterns of wheelchair propulsion of athletes with varying levels of experience.

TEACHERS’ GOALS FOR STUDENT LEARNING IN RACIALLY DIVERSE SCHOOLS - Catherine D. Ennis, University of Maryland, Juanita Ross, Prince George’s County Schools, Landover, MD.

Many urban school districts report that their student population is increasingly minority while their aging teaching population remains primarily while. Although many districts are working to create an atmosphere of cultural respect and plurality, some minority adolescents continue to report feelings of isolation and alienation from the school and its values. Schools and teachers may inadvertently contribute to feelings of alienation by requiring adolescents to participate in instruction that is not meaningful. These feelings may be exacerbated when the curriculum lacks sensitivity to minority students’ culture and ethnicity. Theories associated with teachers’ educational values may provide insight into their goals for student learning in schools with large minority populations. Educational value orientations reflect the relative importance of various curricular influences on the priority that the teacher places on critical components of the learning process. This study examined the extent to which physical education teachers’ educational values mediated their desire to (a) respond to the cultural differences of their students and (b) create an educational environment that minimized feelings of alienation for minority adolescents. Educational value orientation theory was used as the theoretical base for the examination of secondary physical education teachers’ perspectives on the role of traditional curriculum content and the importance of student learning. Ten secondary physical educators and 60 of their students in a large urban school district were interviewed (formal, structured) regarding their expectations, goals for student learning, and criteria for student evaluation. The school district reported a minority student population in excess of 75%, while the minority teaching population was less than 20%. Data were analyzed using constant comparison. Results revealed a conflict between the teachers’ goals for student learning and their expectations for student performance. Although teachers’ expectation for student behavior and performance reflected an emphasis on participation and dress, their goals for student learning focused on both disciplinary outcomes of skill and fitness and a strong learner focus on self-concept and -esteem. Students agreed that they were expected to act like "adults" and participate and dress for class, but they had difficulty articulating their perceptions of the teacher’s goals for learning. Discussion focused on the conflict caused by the inconsistency between teacher goals and expectations as interpreted through educational value orientation theory. White teachers reported that they were "forced" to lower expectations for their minority students because of dropping enrollments in elective classes that threatened their jobs, and the increasing number of students in their classes whom they perceived did not want to learn and participate in the traditional sport-based curriculum.

ASSESSMENT OF A PHYSICAL EDUCATION INTERVENTION BY SPECIALISTS AND TRAINED CLASSROOM TEACHERS

Thom McKenzie, Nell Faucette, James Sallis, & Julia Roby, San Diego State University.

An important goal of physical education is to provide moderate to vigorous physical activity and movement skill development, but studies indicate that children spend little class time being active or practicing skills. The purpose of this study was to document the effects on in-class activity of an innovative curriculum (SPARK) taught by specialists and trained classroom teachers. Student and teacher behaviors and curriculum context were assessed by direct observations of classes. Twenty fourth- and fifth- grade classes in elementary schools in Southern California were randomly assigned to one of three conditions: Control (CO), trained classroom teacher (TT), and trained physical education specialists (PES). CO classes were taught in their usual manner by classroom teachers ; TT classes were taught by classroom teachers who received 21 hours (six sessions) of inservice training plus weekly follow-up consultations by a physical education specialist; and PES classes were taught by physical education specialists trained to implement the curriculum. The SPARK curriculum consisted of daily lesson plans for both fitness and sport skill units. Similar amounts and types of equipment and instructional space were provided for all classes. Trained observers used a previously validated observation instrument (SOFIT: System for Observing Fitness Instruction Time) to obtain measures of student activity level, curriculum context, and teacher behavior during a sample of 88 classes over a four month period. Results indicated students spent the following proportions of time in activity categories: Lying Down, 0.4%; Sitting, 4.9%; Standing 45.7%; Walking, 28.1%; Very Active, 20.7%, with few differences being noted for the three experimental conditions. When class length and adherence to schedule were considered, students in CO classes averaged 4.7 minutes of MVPA (Moderate to Vigorous Physical Activity) per scheduled class, compared to 7.2 and 14.0 minutes for TT and PES classes, respectively. High intensity activity averaged 1.9, 2.9, and 6.3 minutes per scheduled class for CO, TT, and PES conditions, respectively. Lesson context data indicated that PES (38.9%) and TT (34.9%) children spent substantially more time in fitness activities than CO children (22.2%). They also participated in more skill drills and scrimmages (PES, 11.8%; TT, 9.9%, and CO, 6.9%) and substantive knowledge opportunities (PES, 16.0%; TT, 12.6%, and CO, 4.4%) but less in game play (PES, 17.5%; TT, 19.4%, and CO, 55.5%). In regard to teacher behavior, PES teachers spent more time promoting fitness (PES, 38.4%; TT, 28.5%, and CO, 15.1%) and spent less time observing inactively (PES, 0.8%; TT, 6.8%, and CO, 16.3%). The data indicated that the SPARK curriculum promoted much higher levels of physical activity and more opportunities to learn than usual PE curriculum. Trained teachers provided more activity than control teachers but only about half as much as PE specialists. This study is unique in its use of direct observation of student activity engagement, curriculum context, and teacher behavior to assess a curricular innovation.

TEACHER EMITTED VERBAL PROMPTS AND FEEDBACK - IS MORE OR LESS BETTER?

Tom C. Ormond, Ithaca College.

The research literature is conclusive in identifying teacher emitted verbal prompts and feedback (VPF) as a component of effective teaching. The literature, however, differs in the amount of VPF that a teacher should administer to improve student skill performance. The purpose of this study was to identify if either a high or low rate of teacher emitted VPF had greater effect on student skill performance. One female physical education teacher participated in the study when teaching an eight day soccer unit to two, fifth grade classes. The teacher was trained to emit target rates of VPF. High rate days involved the teacher emitting VPF statements each at the rate of greater than five per minute. Low rate days involved a rate of below one per minute. An alternating treatment design was used. Class A received a high rate of VPF on Day One while Class B received a low rate. On Day Two and subsequent days, the rates were alternated. Rate of VPF was checked by the researcher as lessons proceeded. Sessions were videotaped so that student opportunities to respond (OTR) and the demonstration of critical elements (CE) could be measured. Videotapes were coded by the researcher who followed a high, medium and low skilled student throughout the lesson. Interobserver agreement (IOA) checks were calculated on 15% of the sessions. IOA measures of above 80% were calculated for all sessions. Once all videotapes were coded, these data were displayed on graphs and subjected to visual analysis using single subject protocol. Findings indicated that during high rate sessions, student OTR were greater than low rate sessions in four of the eight lessons. During three of the eight lessons, high and low rate sessions were similar. During one lesson the low rate protocol evidenced greater student OTR. During high rate sessions, students' demonstrated more CE than during low rate sessions in five out of eight lessons. During three out of eight lessons, low rates of VPF led to the demonstration of more CE. Viewing the data cautiously, it appears that higher rates of VPF leads to greater student OTR and the demonstration of more CE of the skill. The study, however, must be further replicated across settings and subjects before a functional relationship can be drawn between teacher emitted VPF and student skill performance.

THE IMMEDIATE EFFECTS OF PEER TEACHING UPON NOVICE INSTRUCTOR SELF-PERCEPTIONS OF CONFIDENCE, AWARENESS AND COMPETENCE

A. Brian Nielsen and Linda P. Thompson, University of Alberta

Although most prospective activity instructors have gained considerable experience with the instructional process as students, there can be little doubt that the onset of formal instructional training is a critical milestone in an instructor's development. Often the form of simulation used to provide initial exposure to, and practice in, instruction is that of peer teaching (Metzler, 1990). In addition, it is known that novice instructors often experience discomfort during the early stages of their professional development (Siedentop, 1983), at the very time at which they are exposed to peer instruction. Yet, very little is known about the immediate effects of peer instructional episodes on self-perceptions of novice instructors at such a critical time. The purpose of this study was to determine the effect of an initial peer instruction episode upon the self rated confidence, competence and awareness of students who are beginning formal instructional training. Subjects (n=113) enrolled in a course focussing upon instruction in physical activity settings were required to teach a physical activity of their choice to a group of 18 to 20 peers. Immediately prior to, and immediately following the episode, each instructor privately assessed their feelings of confidence and competence as an instructor, as well as the extent to which he/she felt aware of the components of effective instruction. Finally, the post-episode assessment included a rating of the perceived success of the episode and the degree to which it was perceived to contribute to their development as an instructor. Results indicated that mean confidence, competence and awareness increased from pre- to post-episode, with a significant change in the latter variable ($t(112)=-2.11$, $p<.05$). The majority of the students reported either increases or decreases in each of the variables, indicating that the peer teaching did have some effect upon self-perceptions. Not surprisingly, subject ratings of episode success were most strongly correlated with post-episode confidence ($r=.64$) and self-perceived competence ($r=.73$). Perhaps most encouraging was the finding that subjects rated the experience as contributing highly to their instructional development, independent of episode success ($r=.29$). It is reassuring that peer instruction early in training was perceived as substantially enhancing the awareness and development of novice physical activity instructors.

KNOWLEDGE BASE AND MOTOR SKILL DIAGNOSIS. Victor E. D. Pinheiro, The University of Akron, Akron, Ohio.

This study determined empirical differences in the declarative and procedural knowledge of expert ($n=5$) and novice ($n=5$) track and field coaches as measured by an unannounced knowledge test and the diagnostic accuracy. This test was specifically constructed to assess the coaches' knowledge of the techniques of shot putting (O'Brien style). The test items constructed were relative to the type of errors earlier identified by the expert panel from analysis of videotape on the skills in question. As expected, experts did better than the novices in every section of the knowledge test. Significance was found for the following sections: General, $t(8)=4.87$, $p<.05$; stance, $t(8)=3.58$, $p<.05$; drive, $t(8)=3.77$, $p<.05$; and the total score, $t(8)=3.61$, $p<0.5$. However, this does not mean the novices were lacking in declarative knowledge, just that experts had more. The glide and delivery sections of the test were non-significant. This indicated that the novices roughly knew as much as the experts at least declaratively about the skill. Unfortunately, a statistical significant difference tells us nothing about the procedural knowledge. The mere presence of knowledge in memory does not imply that it will be accessible at the time of diagnosing. By further analyzing the data from the knowledge inventory and diagnostic protocols it was possible to document the problem of accessibility of knowledge during the diagnosis of the skill. Using Pinheiro's (1989) motor skill diagnostic model, the diagnostic protocols were analyzed to determine the diagnostic accuracy. Based on the results of knowledge test of glide and delivery, novices should have been able to pick out errors of these two phases. Four out of five novices selected the correct response on the test item indicating that they had the declarative knowledge to deal with the premature opening problem of the skill. Analysis of the protocols of novices indicated that the specific errors were not detected. This illustration of possessing declarative knowledge on one test item and not using it during the diagnosis may be seen as representative of many items on the knowledge inventory. The novices may have possessed some declarative knowledge but lacked the procedural knowledge to use it. As a result, the diagnostic accuracy of novices was hindered. The results of this study carries implications for teacher preparation programs. A corollary is that curricula must provide opportunity to assimilate knowledge (declarative) and by the same token provide practical experience in using that knowledge in the diagnostic exercises in clinical situations. Diagnosing a variety of similar skills may enhance and develop the procedural skills necessary for diagnostic acumen among future teachers and coaches.

CONTINUITY AMONG TEACHING OBJECTIVES, CLASSROOM BEHAVIOR AND STUDENT LEARNING THROUGH THE TEACHING FEEDBACK MODEL.

Thomas Wandzilak, Lynn L. Mortensen, Ronald J. Bonnstetter and Shawnna S. Kramer, University of Nebraska-Lincoln.

A variety of faculty development opportunities exist at many colleges and universities that promote effective teaching. Workshops, teaching centers and sabbaticals, provide faculty with opportunities to develop a pedagogical base and teaching skills which include improving student/teacher interaction. Professors may be given feedback in a qualitative or quantitative manner, but few opportunities exist that allow for extended follow-up and the integration of student learning in this process. The purpose of this study was to examine the effects of feedback in altering teacher/student behaviors, their interaction and student learning and to determine how these variables relate to the attainment of teaching objectives through the Teaching Feedback Model (TFM). The TFM is a faculty driven process that integrates the systematic observation of student/teacher behaviors with an analysis of student achievement. Based on the information gathered through computer coding of videotaped classroom episodes, a profile is constructed which informs the teacher of the degree to which continuity exists among what is supposed to occur, what happens in class and what the student gains from the lesson.

Seven faculty members from a large mid-western university who teach in a physical education teacher preparation program participated in this longitudinal study. They were interested in improving their ability to ask higher-level questions and solicit thoughtful, extended responses from students, with interaction among students encouraged. A series of workshops were conducted to examine ways to accomplish these intended outcomes. Classes were then videotaped, coded and feedback was given. The process was then repeated. Feedback helped faculty increase student participation, the occurrence of higher order questions, and the use of humor. It also reduced the amount of teacher talk and the frequency of teachers repeating student comments. Student learning data were used to determine progress towards attaining objectives identified by the teacher. In those instances where sufficient learning was not achieved, materials were re-taught during the next class so that students did not fall behind. These examples illustrate the type of impact the TFM can have on achieving desired outcomes.

TEACHER/STUDENT DYADIC INTERACTION OF ELEMENTARY PHYSICAL EDUCATION STUDENT TEACHERS.

Dale E. DeVoe, Colorado State University.

The purpose of this study was to describe the patterns of student teacher behavior directed toward individual students in elementary physical education. Previous research has focused on the teacher/student interactions of experienced physical education teachers with their classes. Three female physical education majors served as subjects for this study. During the 6-week elementary school student teaching field experience, subjects were observed while teaching in classes ranging from kindergarten to third grade in a large Southwest metropolitan school district. All classes were coeducational with 22 to 30 students. Each student teacher was observed in each of five classes on four different occasions for a total of twenty observations per subject. They were also interviewed with a semistructured instrument (Borg and Gall, 1983) that focused on educational background, their philosophical orientation, and the origin of particular practices observed in their classes. The Dyadic Adaptation of Cheffers' Adaptation of Flanders' Interaction Analysis System (DAC) (Martinek and Mancini, 1979) was used as the coding instrument to determine teacher/student dyadic interaction. Inter-coder reliability checks met the 80% criterion level. A total of 7,505 teacher/student dyadic interactions were observed. Of this total 1,277 (17.0%) were teachers' direction-giving behaviors; 1,216 (16.2%) were teachers' information-giving behaviors; 1,143 (15.2%) were students' unpredictable-initiative behaviors; 1,124 (14.9%) were teachers' praising or encouraging behaviors; 687 (9.1%) were teachers' accepting ideas or feelings behaviors; 684 (9.1%) were teachers' questioning behaviors; 560 (7.5%) were teachers' criticizing behaviors; 412 (5.5%) were students' interpretive response behaviors; 301 (4.0%) were students' rote response behaviors; and 101 (1.4%) were nondecipherable behaviors. Male students received the majority of teacher talk (61.9%) with 61.0% of teacher initiated and 63.2% of teacher responses, and female students received 38.1% of teacher talk with 39.0% and 36.8, respectively. In addition, male students slightly dominated student talk (53.9%) with 54.4% of student initiated and 53.2% of student responses, compared to female student's student talk (46.1%) with 45.6% and 46.8%, respectively. Interviews with the student teachers found that the observed interactions were a function of immediate needs and philosophical orientation. Specifically, a high use of directing occurred related to ideas of creating an atmosphere of control and structure considering the organizational skills of the student teachers; and the high use of providing information and praising or encouraging related to ideas of providing supportive feedback.

RADIO-CUEING: A TECHNIQUE FOR CONCURRENT INTERVENTION WITH PRE-SERVICE TEACHERS

Robert M. Hautala, University of Nebraska at Omaha

The purpose of this study was to investigate the effectiveness of a wireless communication system in assisting the development of teaching behaviors of pre-service physical education teachers when it was used to provide prompts for specific behaviors and feedback for observed performance. Pre-service physical education majors alternated five elementary school teaching experiences between teaching which was followed by feedback from their supervising teacher and sessions during which their supervisor communicated to them via a wireless radio communication system. During radio intervention sessions, teachers were prompted to provide skill and general feedback to their students, and look for class situations in which feedback would be appropriate. Also, teachers were given feedback concerning their teaching behaviors as the intervention sessions progressed. Data analysis revealed partial support of the effectiveness of the intervention system [ANOVA $F(4, 38) = 3.067$, $p<0.05$]. Fisher's Test of Multi-comparisons indicated significant increases in the teachers' use of skill feedback statements during each of the two intervention sessions. An insignificant drop in the use of this skill was noted in the non-intervention session which occurred between the two intervention sessions, suggesting some permanence of the prompted behaviors when teaching without intervention. A significant drop in the use of skill feedback was noted in the last, non-intervention session. This drop was perhaps the result of a premature "ending" of the semester by the student-subjects, but raises questions concerning the permanence of the intervention program when the perceived pressure on the teacher to perform is lessened. No significant effect of radio intervention was obtained on the use of general feedback [ANOVA $F(4, 38) = 0.95$, $p>0.05$]. Although subjects appeared to concentrate on the use of skill feedback in their teaching, this appeared to occur at the expense of providing general feedback to their students, and raises questions concerning which behaviors, and how many behaviors at one time, can be effectively cued with the wireless system.

Practical matters concerning the ease of using the system for both students and supervising teachers will be discussed. Future research issues will be presented concerning the sequencing of specific targeted behaviors, the length of time needed for intervention before cueing is phased out. Also, the potential of using the system with subjects with varied teaching experiences, from first time pre-service teachers through student teachers and experienced teachers with specific teaching concerns will be addressed.

ACADEMIC LEARNING TIME IN CANADIAN SECONDARY SCHOOL PHYSICAL EDUCATION CLASSES

Linda Thompson, University of Alberta; Larry Beauchamp, University of Alberta; Paul Darst, Arizona State.

Results of studies using ALT-PE have indicated that students spend much time in activities other than motor engaged at an appropriate level of difficulty. Canadian teachers aware of the results and the focus on the American school settings often raise the question: What are students in Canadian schools doing? The purpose of this study was to examine student engagement patterns measured with the ALT-PE instrument (1982) in a variety of Canadian secondary physical education classes. The subjects (n=356) were randomly selected from 119 typical intact junior (n=44) and senior high (n=75) school physical education classes. A total of 119 lessons involving 28 different activities were observed by three trained observers who maintained above 85% IOA ratings throughout data collection. Data was analyzed according to grade level, gender, activity dimensions (groupings) and separate activities. The results suggest a favorable context for achieving motor learning goals through high proportions of lesson time devoted to subject matter activities (SM MOTOR=58% and SM KNOWLEDGE=13%). Most of this time was devoted to practice (P=21%) and games (G=25%). Students were observed in MOTOR behaviors for 42% of learner involvement time. Learner involvement in successful motor activities (MA) ranged from 4% to 77% with an average of 33% for all activities observed. When students were not motor engaged, they were involved in cognitive (C=21%) and wait (W=21%) behaviors. Wide differences in percentages for all observed behaviors were reported for activities. However, there were similar MA percentages for males and females. Higher MA percentages were observed for high school lessons than for junior high lessons. The results of this study were similar to previous findings, especially for learner involvement patterns. Overall, the Canadian secondary school physical education classes provided a favorable context for motor involvement. The challenge for teachers remains to not only set a favorable context for motor learning but also ensure that students remain involved with subject matter with a high degree of success.

THE DEVELOPMENT AND EVALUATION OF SELF-ASSESSMENT SKILLS AMONG EXPERIENCED PHYSICAL EDUCATORS.

Debra S. Berkey and Ray T. Cool, Western Michigan University.

A review of pertinent literature suggests that student teachers have the capacity to improve teaching effectiveness through the development of self-assessment skills (Siedentop, 1981; Paese, 1984; van der Mars, 1987; DeVoe, 1990). The purpose of this study was to investigate the capacity of experienced teachers to: (1) self-assess effectiveness of instruction; and (2) develop specific self-assessment skills through training and practice. Ten (10) teachers, enrolled in a graduate level teacher preparation course during Spring, 1990, were employed as subjects for this study. All subjects were, at the time of this study, teachers of physical education or coaches in public schools. Each subject taught two twenty minute peer instructional sessions. All subjects utilized the ITIP instructional design during planning. All sessions were videotaped and data was collected utilizing an ALT-PE student-teacher observational system (Hawkins & Wiegand, 1989). Subjects completed a self-assessment form immediately upon completion of both teaching sessions. Subjects then received data-based feedback from one of the two teacher educators instructing the course. Subjects subsequently completed additional self-assessment forms by viewing the videotape of the first session prior to session two. The group data (monitoring = 27.4%; instruction = 41.7%) was similar to teacher data reported in comparable ALT-PE studies (Siedentop, 1983). Subject's years of teaching experience (X = 9.3; r = 1-22 yrs.) showed no correlation with capacity to self-assess instructional effectiveness. Subjects consistently overestimated teacher monitoring behaviors (general observation X = 10%; specific observation X = 10.1%) and teacher feedback (2.4 actual - 3.8 estimation) while underestimating instructional behaviors (verbal instruction X = 11.3%; modeling X = 9.8%). Subjects consistently overestimated the amount of student motor appropriate behavior. Group data indicated improvement from Trial 1 to Trial 2. Estimations, while displaying the same general patterns, were more accurate in 9 of 11 teacher behavior categories and 7 of 9 student behavior categories. All subjects tended to assess performance as being more effective than the data indicated. The results of this study indicate self-assessment skills may only be improved through specific training, practice, and feedback and thus should be a critical component of an effective professional preparation program at both the graduate and undergraduate levels.

COLLEGE/UNIVERSITY REQUIREMENTS OF COOPERATING TEACHERS ACROSS CANADA AND THE UNITED STATES. Patrick J. Ryan and Debra S. Berkey, Western Michigan University.

The question of the effectiveness of public school teachers has stimulated the concern of many educators in recent years. Several students encounter their first real teaching experience in a classroom environment during their professional preparation program. Although the cooperating teacher is recognized as one of the most significant variables in the teacher preparation program, the selection of the cooperating teacher is one of the most neglected aspects of the program (Brodbelt 1980). The purpose of this study was to determine the specific qualification required by small, medium and large sized institutions throughout Canada and the United States. Surveys were sent to nine small (less than 5,000); twenty-two medium (between 5,001 and 10,000); and seventeen large (10,001 and above) institutions in each state and province within the United States and Canada which were randomly selected by the investigator. All United States institutions contacted were listed in the *Physical Education Gold Book*. The overall rate of return totaled 95 percent. The results of the study survey were tabulated into categorical form consisting of several variables. The results showed considerable variance among the institutions regarding the requirments for one to serve as a cooperating teacher.In the United States, only five institutions did not have any specific qualifications or competencies for cooperating teachers. All other institutions required various experiences and competencies ranging from a principal's recommendation to a university course in the supervision of student teachers. All ten institutions in Canada indicated a specific qualification was necessary for an individual to assume the responsibility of a student teacher. Although there are strong inferences that the supervising teacher can determine whether the student teacher has an effective or ineffective experience, the actual professional preparation in many situations, has been left largely to chance. The present system reflects little consistency among the institutions within the United States and Canada. A revised selection process must be designed to ensure consistency within each state and province at each institution regardless of the student population. To address the current differences among programs, specific attention within guidelines imposed by state (Departments of Education) and national bodies (such as NCATE) must be directed to the selection, preparation, and supervision practices of cooperating teachers.

BEST COPY AVAILABLE

THE EFFECT OF AN INSTRUCTIONAL VIDEOTAPE ON THE ABILITY OF PHYSICAL EDUCATION MAJORS TO DIAGNOSE ERRORS IN THE OVERARM THROWING PATTERN.

Susan Wilkinson, University of Illinois at Chicago.

The purpose of this study was to determine the effectiveness of a videotape instructional training program on undergraduate physical education majors' ability to analyze throwing performances. A secondary purpose of this study was to determine if learning how to analyze the overarm throw would generalize to analyzing performances in three overarm throw-related sport specific skills; the badminton overhead clear, the tennis serve, and the volleyball serve. The standing long jump was used as a control skill. Thirteen undergraduate physical education majors participated in the study. A 20-minute instructional videotape training program was shown to subjects one day after the completion of the pretest which measured subjects' ability to analyze six predetermined critical performance elements for the five skills under investigation. The dependent measure was the number of correctly analyzed critical performance elements. One day after the subjects were shown the training program the posttest was administered. The pretest demonstrated subjects inability to diagnose the critical performance elements for the five skills. A dependent t-test was used to determine differences between pre and posttest measures for each skill. The results indicated a statistically significant difference due to the instructional videotape for the throw (t (12) = 13.475, p <.001), the badminton overhead clear (t (12) = 14.5, p <.001), the tennis serve (t (12) = 15.4, p <.001), and the volleyball serve (t (12) = 8.45, p <.001). Differences between pre and posttest scores for the standing long jump did not prove to be significant. In conclusion, the training program had a significant effect on improving the diagnostic skills of undergraduates. After completing the training program subjects could not only analyze the throw, but all throw-related sport skills, with some subjects making a perfect assessment of performances observed.

THE COMPARATIVE EFFECTIVENESS OF MACHINE PITCH AND PLAYER PITCH DELIVERY METHODS FOR DEVELOPING BATTING AND FIELDING SKILLS IN YOUTH LEAGUE BASEBALL.

William T. Weinberg, University of Louisville.

The purposes of this study were to compare the opportunities to develop batting and fielding skills found in youth baseball leagues using a pitching machine (PM) delivery method with those in leagues using the traditional player pitch (PP) format and to examine how effectively players from PM leagues adjust to batting against a pitcher. The significance of the study is that although many youth leagues have recently adopted the PM delivery format to assist 7 - 10 year-olds make the transition from tee-ball to hitting a moving ball thrown by a pitcher, no studies have examined its effectiveness compared with the PP format. Opportunities to develop batting and fielding skills were recorded for each team in a PM league (12 games) and a PP league (11 games) using a coding system developed by Martens, Rivkin and Bump (1984). Both leagues were sanctioned Little Leagues intended for 8 - 9 year-olds. Coding was completed by seven trained observers and inter-observer agreement exceeded 90% for all categories of the coding system both prior to and during data collection. Percentages and response rates were calculated for each of the six batting and eight fielding categories and descriptive statistics were used to compare response opportunities for the two leagues. Results from three post-season tournaments that used the PP format but invited one team from a PM league were examined to ascertain how well players from PM leagues adjusted to hitting against a pitcher. Results clearly indicated that players in the PM league received far more opportunities to practice batting and fielding skills. More specifically, response rates were approximately two to three times higher in the PM league compared with the PP league for the offensive categories of missed swings, foul balls, partial hits, solid hits and on base percentage via swings. Further, players from the PM league swung at 71% of all pitches compared with only 32% for players from the PP league. Players in the PM league attempted and caught fly balls and ground balls twice as frequently as players in the PP league and made 60% more throws per minute of activity. Teams from the PM leagues won 14 of 16 tournament games against PP teams and outscored their opponents by more than a two-to-one margin. The PM teams were defensively superior to their opponents: they committed fewer errors, recorded more assists and converted a substantially higher percentage of batted balls into putouts. It was therefore concluded that because of higher response rates, players from PM leagues receive a greater opportunity to acquire batting and fielding skills than players in PP leagues and that players from PM leagues can quickly adjust to batting against a pitcher.

KNOWLEDGE AND PERFORMANCE IN BADMINTON: A STUDY OF STUDENTS WITH DIFFERENT ENTRY CHARACTERISTICS.

Nyit Chin Keh and Amelia M. Lee, Louisiana State University

Stages of learning have been offered by researchers to help explain how individuals learn motor skills. The higher skilled performer is able to execute motor acts without having to concentrate on the fundamentals and can therefore focus on accuracy, consistency, and game strategies. This study examined how initial knowledge and skill in badminton influenced the thought patterns of students in a beginning badminton class. A secondary purpose was to describe how skill and knowledge facilitated the decision making ability of students during game play. On the basis of performance on a written knowledge test and badminton skills tests given at the beginning of the semester, 14 students (n=7 high-skilled; n=7 low-skilled) were selected for study. Throughout the semester student thoughts were collected under 4 instructional conditions (verbal instruction/demonstration; controlled practice; group practice and game play). Students were trained to record their thoughts when a signal was given. During game play two types of interviews were used to assess the students' strategic knowledge during singles play. A situation interview consisting of open-ended questions was designed to examine what students think about in various game situations. A point interview was used to assess how knowledge was applied during actual game play. After every third point students were asked "What were you thinking about while you were playing that last point?" and "What will you do next?" Thought sample data were coded on a 6-point ordinal scale which indicated a level of attention. Interview data were audiotaped, transcribed verbatim and coded into categories representing goal concepts. Results indicated that the level of attention varied according to the instructional event. Higher attention scores regardless of skill level were evident during controlled practice and game play with lower levels of attention during verbal instruction and group practice. The number and variety of goal concepts reported during game play varied as a function of skill level. The high skilled students reported more strategic concepts and had more interconnections among concepts. The findings from the interview data support previous research and are in agreement with the theoretical frameworks for learning motor skills. The game performance of the higher skilled students was influenced by their strategic knowledge in problem solving situations. The findings from thought sampling data have implications for teachers and teacher educators. Levels of attention were higher for both skill groups when the teacher and students were actively involved in the teaching learning process.

THE EFFECT OF A CLINICAL TEACHING EXPERIENCE ON PRESERVICE TEACHERS' PLANNING AND TEACHING BEHAVIORS.

Mary C. Marks, California State University, Los Angeles; Mark Byra, University of Wyoming.

The purpose of this study was to examine preservice teachers' preactive and interactive behaviors during a clinical teaching experience. Two questions were addressed in this study: (1) Can selected planning and teaching behaviors be learned by preservice teachers in an 8-week teaching experience? (2) Can these selected behaviors also be observed in perservice teachers' planning and teaching three months later? Fifteen junior level physical education majors served as subjects of this study. Each subject planned and taught two 30-minute lessons in fundamental movements and gymnastics, twice a week, for eight weeks. This was the first formal teaching experience for all of the subjects. Three planning variables were analyzed: (1) instructional objectives; (2) task progressions; and (3) critical skill cues. Three interactive behaviors were also analyzed: (1) general feedback statements; (2) specific feedback statements; and (3) learner time on task. ANOVAs (repeated measures) and chi square analyses were utilized to examine the effect of the three interventions on the selected planning and teaching behaviors and maintenance of these behaviors beyond the three interventions. Significant findings were revealed for the planning behaviors in both activity areas. After the first intervention, mean scores for instructional objectives increased from 1.8 (baseline) to 2.4 in gymnastics and from 1.4 (baseline) to 2.5 in fundamental movement. Skill progressions were employed in 20% of the gymnastics and 6% of the fundamental movement plans during the first week. This increased to 90% and 75%, during the seventh week, respectively. Critical skill cues were employed in 40% of the gymnastics and 33% of the fundamental movement plans during the first week. This increased to 92% in both activities during the seventh week. Similar findings were revealed for specific feedback statements and learner time on task. The analyses of the follow-up data revealed that, after 12 weeks, the preservice teachers had at least maintained the same performance levels that were achieved during the seventh week of the experience. This study shows that an 8-week clinical teaching experience of perservice teachers' planning and teaching behavior can be changed when objective feedback is provided by university supervisors. In addition, these behaviors can be maintained over time. These findings suggest that there may be implications for curriculum development in teacher preparation programs in physical education.

THE EFFECTS OF COOPERATIVE AND INDIVIDUALISTIC GOAL STRUCTURES ON TENNIS SKILLS OF BEGINNING STUDENTS.

Joseph D. Brown, Stetson University; Jack Chevrette, Texas A&M University.

The purpose of this study was to determine the effects of two learning structures on the tennis skills of beginning students. Subjects for this study consisted of 68 students enrolled in two beginning tennis classes of a university physical education activity program. All subjects were administered the AAHPERD Sports Skills Test for Tennis at the beginning of the study for the purpose of grouping and testing for initial differences. A stratified random sampling procedure was used to insure that an equal number of high, medium, and low performing subjects were included in each of the treatment groups (cooperative and individualistic). Subjects in the cooperative learning structure were placed in groups of four to five members with at least one low, medium, and high performing subject in each group. Cooperative treatment subjects were informed at the beginning of the study that 20% of their final skills grade would be based on the group average. Subjects in the cooperative group were encouraged to talk to each other during practice time giving helpful comments and praise to each other. At the end of each class session, the subjects were allowed time to discuss and evaluate ways to improve their performance. Subjects receiving the individualistic structure were instructed at the beginning of the study tat their final skills grade would be based on individual performance compared to a pre-determined standard. Students were instructed not to interfere with each others' performance and to direct all questions to the instructor. Data collected for analysis were obtained for subjects' scores on the tennis skills test taken at the end of the study. A multiple analysis of variance (MANOVA) was performed on the data with univariate analysis of variance (ANOVA) performed as the follow-up procedure. The following conclusions are warranted based on the data in the study: 1. Beginning tennis players in a cooperative learning structure perform significantly better on tennis serve skills test than those subjects in an individualistic learning structure. 2. The performance of subjects in a cooperative learning structure for groundstrokes and net volley tennis skills tests are not significantly better than students in an individualistic learning structure.

COMPARISON OF CONTINUOUS RECORDING TO INTERVAL RECORDING UTILIZING VARYING LENGTHS OF REST PERIODS

Michael J. Stewart & David Destache, University of Nebraska at Omaha

Interval recording has been widely used in physical education pedagogical research, yet little evidence is in the literature suggesting this measurement technique is a valid estimate of continuous recording. The purpose of this study was to determine if selected lengths of rest intervals (5-sec, 10-sec, & 20-sec) utilized in interval recording would yield valid estimates of continuous coding of management, instruction, and activity climates in a physical education setting. Nine physical education teachers were the subjects in the study. Each subject was video taped so the classroom climate could be coded. Video tapes were dubbed with a start and finish signal and were synchronized with a tape recorder. Interobserver reliability was assessed throughout the study with at least one check in each of the four measurement techniques. Interobserver agreement results ranged from .86 to .94. To determine the estimated number of seconds in the three interval instruments, all recording intervals for each climate in each instrument were totaled, multiplied times five, then multiplied times the appropriate factor depending on the ratio of rest interval to observe interval. Comparisons of the estimates of time for each climate and each instrument were then compared to the continuous data utilizing a one-tailed t-test. Results indicated that when compared to continuous recording, the 5-sec, 10-sec, and 20-sec rest intervals are valid estimates for the climates of management and instruction ($p > .05$), but only 5-sec and 10-sec rest intervals are valid intervals for the climate of activity ($p > .05$). The findings of this study are inconsistent with recommendation by Johnston and Pennypacker (1980) and Siedentop, Tousignant, and Parker, (1982), who have suggested that the more samples collected during an observation period, the more accurate the estimation. Suffice it to say, there are a number of independent variables which may influence the outcome of results and a limiting factor in this study may very well had been the small number of subjects. However, the results do raise some important concerns which should be investigated further.

PRACTICE BEHAVIORS OF ALBERTA SOCCER COACHES.

M.B. Dyck, Trinity Western University (Canada); M.A. Parker, University of North Dakota; C.L. Pemberton, University of Missouri-Kansas City; C.A. Humphries, University of North Dakota.

Recently sport research has increasingly focused on the multidimensional aspects of coaching. Under the assumption that much of coaching is a teaching experience, one area of particular interest has been the attention paid to the pedagogical aspects of coaching. The premise being that if coaching behaviors could be observed and developed, then the motor skill level of athletes would subsequently be increased. This route assumes skill improvement is a desired outcome of sport, related to pedagogical behaviors. As studies have equated effectiveness with win/loss records, not necessarily increased skill level, most coaches studied have been elite, paid, winning coaches. With the exception of Burton and Tannehill (1988) volunteer, unpaid, recreational level coaches have rarely been studied. The purpose of this study was to describe the pedagogical coaching behaviors of trained volunteer soccer coaches relative to what is known of effective pedagogical behaviors. A secondary purpose was to determine any differences in the coaching behaviors of coaches who had successfully passed a practical assessment and coaches who had not. The subjects were nine, experienced (8 or more years), male soccer coaches in Alberta who had passes at least the first two levels of association sanctioned certification requirements. Subjects were observed via the Coaching Behaviors Observation System (Burton & Tannehill, 1985) for three one-hour practice sessions. The instrument was designed to assess athlete behaviors (climate), interaction between the coach and the athletes, and coaching behaviors. Dependent variables were the behavioral categories within each dimension of the CBORS instrument. Mean percentages were calculated for each dependent variable to describe the coaches' behaviors. Generally, it was predicted that these coaches would make appropriate use of key pedagogical behaviors within the appropriate environment. ANOVAs were run for each dependent variable by dimension. The only hypothesis supported was that more positive than negative feedback would be used ($p<.05$). Coaches who had passed a practical assessment were not significantly different on any measures from those who had not passed according to t-tests comparing the groups. This study demonstrates the need for coaching education programs to go beyond the "cookbook" approach; to not only increase the awareness of effective teaching/coaching behaviors, but to increase the application and monitoring of those the behaviors in practice sessions.

THE ROLE OF CONTENT KNOWLEDGE IN TEACHING PHYSICAL EDUCATION. Melinda A. Solmon, Amelia M. Lee, & Katherine Hill, Louisiana State University

Concern about the knowledge base for effective teaching has become a focal point in recent educational reform movements (Shulman, 1986). The effect of content knowledge in teaching physical education was the focus of this study. Specifically, the questions guiding this inquiry were a) how do teachers of comparable pedagogical skill but differing levels of content knowledge differ during interactive teaching? and b) what effect does a difference in content knowledge have on student achievement? The two teachers selected to participate in the study were graduates of teacher preparation programs in physical education. Both had successful student teaching experiences, but neither had held a teaching position. Ratings for the two teachers on state evaluation tools were comparable and they were considered to be equal in general pedagogical skill and knowledge. One teacher (low content knowledge) had no competitive experience in volleyball and relied primarily on collegiate course work and textbooks to prepare lessons. The other teacher (high content knowledge) had been a collegiate volleyball player at a major university and possessed expert content knowledge about this sport. Subjects for the investigation were 24 female Elementary Education majors with no previous volleyball experience who were enrolled in a physical education methods class. They were pretested on the forearm and overhead passes and then randomly assigned to one of the two teachers. Subjects participated in four, one hour instructional sessions on these two skills. The lessons were videotaped for subsequent analysis. Teachers in the study kept a daily log about their thoughts and impressions. All subjects were post tested at the conclusion of study on the skill measures. Although both teachers used class time effectively and demonstrated sound pedagogical techniques, differences were evident during interactive teaching. The low content knowledge (LCK) teacher lacked the expertise to effectively analyze student performance and provide specific corrective feedback. She tended to spend time in general observation during practice and provided general positive reinforcement. In contrast, the high content knowledge (HCK) teacher actively interacted with students during drill and practice and provided specific feedback with regard to errors. Differences in teacher expectations were also evident. The HCK teacher was concerned about development of technical skill while the LCK teacher seemed content with student performance levels and anxious to move on to game situations. A repeated measures multivariate analysis of variance of the skill measures revealed that both groups demonstrated a significant gain in skill but that students in the HCK group improved at a faster rate than students in the LCK group. These findings support the notion that a high level of content specific knowledge can facilitate effective teaching.

LEARNED HELPLESSNESS: A CASE STUDY IN PHYSICAL EDUCATION

Mary D. Walling, Purdue University

The term "learned helplessness" is used to describe the "psychological state that frequently results when events are uncontrollable" (Seligman, 1967). Interest in this condition has steadily increased among psychologists and educators, but little is known about how learned helplessness is manifested in the context of physical education. The purpose of this study was to provide a detailed description of learned helplessness through a case study of a sixth grade physical education student. The student was identified as a plausible victim of learned helplessness by the researcher (a part-time physical education student at the school) who observed the student's lack of motiation, tendency towards expecting failure outcomes, and hesitancy in accepting responsibility. In cooperation with the school administration and teaching staff, a profile of the child was created which included family background information, comprehensive schooling information, and input from the child's previous elementary teachers. This profile corroborated the initial learned helpless classification. The Intellectual Achievement Responsibility (IAR) Questionnaire (Crandall, Katkovsky, & Crandall, 1965) was administered to assess the student's perceptions of her personal control over success and failure experiences. The subject scored two and a half standard deviations below the mean for sixth grade girls on the IAR, confirming the child's extreme tendency towards learned helplessness. A period of two weeks was then designated for observing the subject in a variety of school settings including physical education. The data was derived from extensive field notes taken from these observations, as well as personal interviews conducted with the subject and the individual teachers each week. A qualitative analysis of the data was conducted, whereby themes were identified which best describe the subject's learned helpless condition. The results were conceptually grounded in contemporary social cognitive theories of achievement motivation (Dweck, 1986; Nicholls, 1984) which suggest that learned helpless behavioral patterns in physical education stem from such factors as the goal orientation which the student adopts, along with his/her present confidence in ability. Implications for physical edcucation instructors currently working with learned helpless students (i.e., how to identify a learned helpless student and interfene to remediate this condition) are discussed. Future directions for research on learned helplessness in physical education are also provided.

THE EFFECT OF TWO TREATMENT CONDITIONS ON THE ACCURATE OBSERVATION OF MATURE PATTERNS FOR OVERHAND THROWING AND CATCHING.

Elisa Maria Salazar-Solis, Universidad Nacional de Costa Rica; Lynda E. Randall, California State University, Fullerton.

The purpose of this study was to compare the effectiveness of two treatment conditions on the accuracy of observation of mature patterns of overhand throwing and catching by pre-professional physical education majors. A posttest-only control group design was used to compare the efficacy of the three treatments (film, slide, no intervention). Observational criteria of mature throwing and catching patterns, for both independent and dependent measures, were adopted from the Michigan Educational Assessment Program (MEAP). Experimental interventions, consisting of a total of one and one-half hours (including 45 minutes for overhand throwing and 45 minutes for catching) were designed for each of the film and slide presentations. The control group received no intervention. Subjects in the study were 50 students (24 females and 26 males) who were undergraduate physical education majors. These subjects were randomly assigned to the three treatment conditions. Post-intervention data were collected from all subjects for the purpose of determining their observational accuracy. Two videotape tests (throwing and catching) and scoring forms were constructed for use in obtaining post-intervention measures of accuracy of observation. Each test had a maximum attainable score of 60 points. Content validity and reliability of the tests were established through pilot studies. The design for the data analysis consisted of two 1 (skill) by 3 (treatments) analyses of variance (ANOVA). Preliminary analysis of the data, using the Bartlett (1989) test, supported the assumption of homogeneity of variance for both comparisons. In each one-way ANOVA, there was 1). one independent variable with three levels: film intervention, slide intervention, and no intervention; and 2) one dependent variable, accuracy of observation, measured by the observer's scores on the application of the posttest for the diagnosis of overhand throwing and catching skills according to the MEAP criteria. Analysis of the data revealed that the groups were similar with respect to posttest means of observational accuracy for overhand throwing ($\bar{X}$ film = 39.3, $\bar{X}$ slides = 37.4, X control = 39.38). Additional analysis of the data showed that the groups were different with respect to posttest means of observational accuracy for catching. Analysis of variance indicated that the obtained differences were statistically significant (F= 3.89, p=.03, df= 2,47). A post-hoc comparison, using Tukey's Honestly Significant Difference (HSD), resulted in the location of only one significant difference (F= 2.85, $p \geq .05$). The film intervention group performed significantly better ($\bar{X}$= 44.7) than the slide group (X= 42.3) and the control group ($\bar{X}$= 39.8). The slide group did not differ significantly from the control group. Scores of the film and slide training group did not differ significantly. Within the constraints of this study, it was concluded that 1). Film and slide training interventions have no significant advantage over no training in the acquisition of observational accuracy for the mature pattern of overhand throwing; 2). Film training is superior to no training in the acquisition of observational accuracy for the mature pattern of catching; 3). Film training is not significantly superior to slide training in the acquisition of observational accuracy for the mature pattern of catching; and 4). The Michigan Education Assessment Program, and similar process measures of fundamental motor skills, require more extensive training in order to obtain accurate assessments.

The Wellness, Efficacy, Stress and Effectiveness of Physical Education Teachers: A Preliminary Study. Paul C. Paese, Tinker D. Murray, Steven R. Furney and Charles Johnson, Southwest Texas State University.

An abundance of research has been completed on the teaching effectiveness of physical education teachers, especially at the preservice level (Locke, 1984.) Research on teacher efficacy and stress has mainly been with student teachers in physical education (Metzler, Darst & Van der Mars, 1990; Paese & Zinkgraf, 1990). The major void in these lines of research is that the focus has been on preservice physical educators and the absence of research on the overall wellness within the profession. The purpose of the first phase of this study was to collect demographic and descriptive data on physical education teachers and general classroom teachers on their health risk, efficacy, stress, etc. The subjects for this study were from a small metropolitan school district in Central Texas. Data were collected at the beginning of the school year and again at the conclusion of the year. Instruments used for data collection were the Health Risk Appraisal Instrument (Center for Disease Control, 1988), Teacher Efficacy Scale (Gibson & Dembo, 1984), Teacher Stress Scale (Pettegrew & Wolfe, 1982), and the Texas Teacher Appraisal System (Texas Education Agency, 1986). Results following data analysis (ANOVA) illustrated no significant differences between "regular" classroom teacher groups and physical education teachers on age, height, weight, teacher efficacy (general and personal) and teacher stress variables (role ambiguity, role overload, role preparedness, job satisfaction, and illness symptoms). There were also no significant differences between health risk and activity levels of physical education teachers when compared to classroom teacher groups. The major difference between the groups was on the summative score in the overall teaching effectiveness in favor of the classroom teacher groups ($p<.05$). Some of the major conclusions on the first phase of this study are as follows; (1) physical education teachers are not different from their classroom counterparts on health risk or activity/fitness levels which may raise a question on the fitness levels of children and the overall physical education curriculum in general, (2) problems reported in the literature for physical education teachers (isolation, class size, lack of equipment/ facilities, teacher/coach conflict) seem to not produce more stress or lower efficacy scores when compared to regular teacher groups, and (3) since physical educators scored lowest in the state teacher effectiveness evaluation, this could signify problems in the generic evaluation process for physical educators or that physical education teachers are truly less effective than regular classroom teachers. The use of systematic observation on all teacher groups is being analyzed at the present time to support/disclaim the last conclusion.

*This study is the first phase of a grant funded by the LBJ Institute for the Advancement of Teaching and Learning.

SELF-CUEING THE MECHANICS OF THE RETURN OF SERVE IN TENNIS

Dennis K. Landin and David M. Cutton, Louisiana State University.

The role of feedback during motor skill acquisition is well documented in the motor learning literature and considerable evidence suggests that settings devoid of feedback impair acquisition. However,the logistics of teaching and coaching settings often prevent instructors from providing sufficient feedback. Efforts to offset the lack of feedback during skill acquisition have focused on the design and implementation of self-cueing procedures (SCP). SCP are short sequences of one word cues which are verbalized by learners while performing motor skills. Each cue prompts a specific phase of the skill and reminds the learner of the correct technique and/or timing of the strokes' critical elements. Recent research has shown that SCP enabled beginners to improve performances on tennis groundstrokes and experienced players to refine the overhead smash. It was the purpose of the present study to determine the effectiveness of a SCP while performing a high speed, complex skill, the return of serve in tennis. Subjects for this study were members of an NCAA Division I tennis team (N=8). Each subject hit 60 serve returns per day for 10 consecutive days. Phase 1 of the study involved days 1-5 and continued the serve return drills regularly performed in practice. A single augmented feedback statement was provided after every 10 trials. In phase 2 (days 6-10) a SCP was used by the subjects and involved verbalizing cues to prompt the critical elements of the stroke. Augmented feedback was not provided in phase 2. Performance scores reflecting the number of returns which landed in the target area, and mechanical scores obtained from daily videotapes, were collected during both phases of the study and analyzed through separate randomized block MANOVAS. The results revealed significant improvements in performances F(7,5)= 6.77, p<.0002 and mechanics F(7,5)=13.83, p<.0001. These findings are consistent with the conclusions of earlier self-cueing research and suggest that SCP, implemented in settings devoid of augmented feedback, can improve performances and prompt correct stroke mechanics. Therefore, SCP have considerable potential as instructional aids in settings where instructors are unable to provide frequent feedback.

THE EFFECTS OF GOAL SETTING ON SELECTED VERBAL BEHAVIOR OF A PHYSICAL EDUCATION STUDENT TEACHER.

Mary Jo Sariscsany, Kent State University

The rapid occurrence of events in the physical education setting often prevent student teachers from focusing on their behavior toward individual students. By providing student teachers with systematic reliable information about their classroom behavior, specific goals can be established which heighten the awareness of his/her behaviors and provide opportunities for refinement. The purpose of this study was to examine the effectiveness of a simple goal setting intervention on increasing the use of positive behavior feedback and positive specific skill feedback of a secondary physical education student teacher. A multiple baseline design was selected to determine the effectiveness of goal setting. A female student teacher was audiotaped while teaching 20 sessions of a ninth grade class. The intervention was applied daily by the cooperating teacher. Using event recording techniques the cooperating teacher recorded the rate of occurrence during each class period. Following each session a rate 10% higher than what was recorded was determined for the next day. A small tape recorder recorded the verbal behavior. Five audio tapes were randomly selected and recorded by the investigator to determine the accuracy of the data collected. The resulting accuracy percentages ranged between 93.5% and 98.5%. Following a stable baseline, mean rate of .56 p.m., positive behavior feedback was the first behavior selected for increased use. Positive specific skill feedback was targeted for increase following the 11th session, after baseline data showed consistently low rates, .20 p.m. During the intervention phase of positive behavior feedback, the mean rate was increased to 1.66 p.m. The mean rate of occurrence for positive specific skill feedback increased to 1.02 p.m. Procedural reliability was established due to the absence of change in positive specific skill feedback when the first target behavior was selected for increase. This study demonstrated that a student teacher's behavioral interaction could be successfully increased using simple goal setting techniques. The technique of goal setting allows the student teacher the opportunity to practice the use of selected behaviors which may lead to further understanding of its use and in all likelihood increase the chances the behavior will be remembered and used in future classroom settings.

INSIGHT INTO THE SOCIALIZATION OF BEGINNING PHYSICAL EDUCATION TEACHER EDUCATORS.

Kay M. Williamson, University of Illinois at Chicago, Illinois.

Little information exists on the people who prepare teachers (Clarke, 1989; Lanier & Little, 1986; Sirotnik, 1990; Wisniewski & Ducharme, 1989). Within our own profession, various authors have implored the necessity to undertake research on physical education teacher educators (Dodds, 1987; Locke, 1984; Lawson, 1990). The purpose of this paper is to describe the experiences of five female physical education teacher educators in the initial years of their profession. All participants had their doctorate, and were in tenure track positions in either Research I or Research II universities (Carnegie, 1987). Data were collected using qualitative methods: weekly journals and in-depth interviews. A proposal was sent to all prospective participants outlining the categories to be used in the journal, these included: research, teaching, service, supervision, faculty interaction, and any other pertinent categories that emerged. Interviews were conducted to clarify information in the journal. The study was a collaborative effort with collective decision making in recording, sharing, and analyzing data. Data were analyzed inductively for themes that connected the experiences of participants (Lincoln & Guba, 1985; Patton, 1980). Sections of the journals and interview transcripts that showed patterns across participants were identified and labeled. The results will be presented using the participants' own words, as Polkinghorne (1988) stated, narrative is "the primary form by which human experience is made meaningful" (p. 1). Results of this study give insight to professional and organizational socialization processes of these assistant professors. Each participant experienced personal and professional rewards and frustrations. In some cases, institutional expectations and the means to meet professional demands were congruent. However, there were also occasions when participants struggled to compromise and balance personal role preference with institutional expectations. Although the results of this study cannot be generalized, each reader or listener may transfer (Lincoln & Guba, 1985) and relate their own experiences to the data. Describing the experiences of beginning teacher educators could help to develop a formal mentoring system for new faculty. As such, the results of this study may give: senior faculty cognition of the important explicit and implicit role they play in the socialization of neophytes; junior faculty insight through which to compare their own experiences; and graduate students an appreciation of what to expect in the early years of their career at a Research I or II institution.

ATTITUDES AND PERCEPTIONS OF SENIOR HIGH SCHOOL PHYSICAL EDUCATION CURRICULA.

Ross L. Friesen, University of Kansas; L. Marlene Mawson, Illinois State University; Carol J. C. Church, Lawrence, Kansas Public Schools.

Differences in attitudes and perceptions toward Senior High School Physical Education curricula among students, parents, teachers, and administrators were determined by soliciting responses to the Secondary School Physical Education Questionnaire from 381 randomly selected students (N=155), parents(N=108), teachers(N=78), and administrators(N=40) representing the thirty-two largest high schools in Kansas. The mean differences among groups in the responses to the 23-item survey were evaluated on a 6-point Likert scale. ANOVA and the Duncan Post Hoc Test were used to assess significant mean differences at the .05 level. In comparing attitudes among the four groups, several significant differences were revealed. Students and parents had significantly higher mean scores than teachers and administrators in areas of socialization and having fun; student input; selections of courses; and student election to participate in physical education classes. Teachers and administrators had significantly higher mean scores in areas concerning meeting the needs of students including providing for equal participation for all students; adequate facilities, equipment, and supplies; and the importance of physical education in the school curriculum. Group perceptions of what is actually occurring in the physical education curriculum were similar. Students saw physical education more as an opportunity to socialize and have fun than the other three groups. Parents had significantly higher scores in the perception that gymnastics and dance were emphasized in the curriculum. Also, parents were significantly lower in the belief that lifetime sports were being emphasized. Teachers and administrators had significantly higher scores in these areas: the importance of physical education in the total curriculum; and adequate facilities, equipment, and supplies. Administrators had significantly higher mean scores in the categories of equal participation in all activities for all students; and meeting individual needs and interests. The results of this study show that there are greater differences between groups in attitudes about what people ideally believe should be a part of the physical education curriculum than there are in the perceptions of what actually is occurring. These results also imply that school personnel perceive the physical education curriculum to be better meeting the needs of all students than do the students and their parents.

PRESERVICE PHYSICAL EDUCATION TEACHERS' AND PRESERVICE ELEMENTARY CLASSROOM TEACHERS' OBSERVATIONS DURING AN UNGUIDED FIELD EXPERIENCE.

Debbie Howell and Hollie Harris, University of Central Arkansas, Conway, AR.

Little research has focused on observation as a teaching behavior. Therefore, the primary purpose of this study was to compare the observational content of preservice physical education teachers (PPET) and preservice elementary classroom teachers (PECT). A second purpose was to identify the perceptual processes used. Subjects were 10 senior PPET and PECT (N=20). Criterion sampling was used to select subjects. The observational content was a 20 min videotaped volleyball lesson of a 5th grade elementary physical education class. The introspective data collection techniques of think aloud (TA) and stimulated recall interview (SRI) were used. All data was collected individually with the SRI scheduled within one week following the TA. The constant comparative analytical strategy was used for data analysis. Three dimensions, 16 categories and 39 subcategories emerged from the data. Inter- and intracoder reliability was established at .80. Data was converted to percentages for group comparison. Results show PPET made more observations (309) than PECT (203). Both groups' observations focused on the teacher dimension (PPET 172, 56%; PECT 117, 59%) followed by the student (PPET 88, 28%; PECT 52, 25%) and then the lesson (PPET 49, 16%; PECT 34, 16%). Within the teacher dimension, two categories teaching technique (PPET 91, 53%, PECT 72, 62%) and management (PPET 66, 39%, PECT 27, 23%) received the most attention. The greatest frequency of observations in the teacher technique category described teacher feedback (PPET 46, 50%; PECT 35, 49%). Both groups focused on a broad range of behaviors in the student category; however, only a small number of observations related to movement responses were recorded (PPET 21, 7%; PECT 6, 3%). This result for PPET is particularly discouraging. Within the lesson category, content received the most attention PPET (36,76%) and PECT (25,74%). The most commonly used perceptual process was expectancy set. The expectancy set, teacher's verbal behavior, exerted the greatest influence on both groups' observations. In summary, both groups exhibited a narrow focus of observation. Findings suggest that preparation programs must teach preservice teachers how to observe the complex world of the classroom.

EFFECTS OF CAFFEINE ON METABOLIC RESPONSES OF AEROBICALLY TRAINED MALES DURING PROLONGED EXERCISE AT LOW AND MODERATE AEROBIC INTENSITIES.

Hermann-J. Engels, Wayne State University, Detroit; Emily M. Haymes, Florida State University, Tallahassee.

Past exercise research of caffeine has primarily focused on its potential ergogenic effects to improve the endurance of elite athletes. Consequently, most study designs included relatively high submaximal exercise intensities (60-80% VO2max). The purpose of this study was to examine the influence of caffeine on metabolism during prolonged exercise at low and moderate aerobic intensities. Six non-smoking, aerobically trained males (VO2max: 58.0 ml/kg/min, SD ± 6.0) with a low habitual caffeine intake (<100 mg/day) each completed a total of four 90-min treadmill walking tests (two at 30% and 55% VO2max, respectively) with and without prior caffeine intake. The order of tests was randomized and followed a counterbalanced format. Caffeine (5 mg/kg body weight) and placebo solutions were given orally 60 min prior to exercise in a single blind fashion. Blood concentrations of FFA, glycerol, glucose, and lactic acid were determined spectrophotometrically; VO2, VE, and RER were measured using open circuit spirometry. Pre/post exercise FFA, glycerol, glucose, and lactic acid concentrations were not significantly different between caffeine and placebo trials (>0.05). Post-exercise FFA and glycerol levels were significantly elevated from pre-exercise levels and were higher after the 55% VO2max exercise trials when compared to the 30% VO2max tests. Gaseous exchange indicated that caffeine had no effect on exercise VO2 and RER values ($p>0.05$), but significantly increased VE ($p<0.01$). In conclusion, the present findings on energy substrate responses and gaseous exchange offer no evidence in support of a significant effect of 5 mg/kg caffeine on substrate mobilization and/or a change in utilization during prolonged exercise at low and moderate aerobic intensities in aerobically trained males.

RELATIONSHIP BETWEEN $\dot{V}O_2$ MAX AND RUNNING ECONOMY IN ELITE LONG-DISTANCE RUNNERS.

Don W. Morgan, The University of North Carolina at Greensboro; Jack T. Daniels, State University of New York at Cortland.

Running economy (RE), defined as the aerobic demand of submaximal running, is an important correlate of distance-running success among athletes roughly comparable in maximal aerobic power ($\dot{V}O_2$ max). While much of the available evidence supports the lack of association between RE and $\dot{V}O_2$ max, it has recently been suggested that an inverse relationship between RE and $\dot{V}O_2$ max may exist among trained subjects of similar ability. To evaluate this possibility, RE and $\dot{V}O_2$ max values were obtained on at least one occasion on 22 male long-distance runners ($\bar{X}$ age = 27 ± 2 yrs; $\bar{X}$ height = 178.6 ± 6.8 cm; $\bar{X}$ body mass = 63.8 ± 5.4 kg) who were training for the 1984 Olympic Trials. Subjects performed 6-min, submaximal, level-grade treadmill runs at four speeds (4.47 to 5.50 m/s) to determine RE. $\dot{V}O_2$ measures obtained during the last 2 minutes of each run were expressed relative to distance traveled and averaged across speeds to derive a mean RE value. Shortly following the RE tests, a constant-speed, grade-incremented treadmill test was performed to determine VO_2 max. When more than one set of RE and $\dot{V}O_2$ max data were available for any athlete, the average of all tests was used to represent that subject. Results from the study indicated that mean $\dot{V}O_2$ max and RE values were 75.8 ± 3.4 ml/kg/min and 184.6 ± 8.6 ml/kg/km, respectively. Correlational analyses also revealed a moderate relationship ($r = 0.59$; $p \leq 0.05$) between VO_2 max and RE. In conclusion, these data suggest that among a group of elite distance runners exhibiting similar training profiles, a lower aerobic demand of running (i.e., better RE) is associated with a lower $\dot{V}O_2$ max.

MAGNITUDE AND DURATION OF POSTEXERCISE ENERGY EXPENDITURE FOLLOWING UPPER BODY EXERCISE

Darlene A. Sedlock, Purdue University.

To date, studies focused on excess postexercise oxygen consumption (EPOC) have involved lower body exercise almost exclusively. No data exist concerning this phenomenon following upper body aerobic exercise. It is important to study the physiology of upper body exercise since this type of activity is employed for many recreational, sport, health locomotory, vocational, and clinical/diagnostic reasons. The purpose of this study was to examine the magnitude and duration of EPOC following upper body exercise, using lower body exercise for comparison. Eight subjects (four male and four female) volunteered to participate. Mean (±SD) age, height and weight were 22.3±1.5 yr, 173.4±11.7 cm and 71.2±14.4 kg, respectively. The experiment consisted of a 20 min exercise at 60% of each subject's previously determined mode-specific peak oxygen uptake ($\dot{V}O_2$) using an arm crank (AC) and cycle (CY) ergometer. Order of testing was counterbalanced, and performed on separate days after an overnight fast. Baseline $\dot{V}O_2$ and heart rate (HR) were measured during the final 15 min of a 45 min seated rest prior to each exercise. $\dot{V}O_2$ and HR were measured continuously during the postexercise period until baseline $\dot{V}O_2$ was re-established. AC peak $\dot{V}O_2$ (1.94+0.57 L·min-1)) averaged 72% of CY peak $\dot{V}O_2$ (2.68±0.73 L·min-1) which is consistent with the literature in this regard. Baseline $\dot{V}O_2$ was similar prior to the AC (0.26±0.06 L·min-1) and CY (0.24±0.05 L·min-1) exercises. No significant difference was noted for duration of EPOC between the two conditions (t(7)=0.24, p>.05). Values averaged 22.9+13.7 min for AC and 24.2+19.4 min for CY. Magnitude of EPOC was relatively small and averaged 9.2+3.3 and 10.4±5.8 kcal for AC and CY, respectively (t(7)=0.69, p>.05). There was no significant difference in HR between the two conditions at baseline, during exercise, or at the end of the EPOC period. For the experimental conditions of this study, the results indicate that the EPOC response following arm cranking was similar to that following cycling exercise at an equal relative metabolic intensity. Within the framework of the chosen exercise conditions, these findings suggest that EPOC may be related primarily to the relative metabolic rate of the active musculature, as opposed to the absolute $\dot{V}O_2$ or quantity of active muscle mass associated with these two types of exercise.

WEIGHT LOSS OF OBESE WOMEN ON THE THERMIC EFFECT OF EXERCISE.

ZV Kendrick, CD Chesmel, DA Feldman, DP Birdsall, GD Foster, &
TA Wadden, Biokinetics Research Lab., Temple Univ., and Obesity
Research Cnt., Univ.of Pennsylvania, Philadelphia, PA 19122

Diminished energy requirements at rest and possibly during ambulatory activity have been reported to occur in weight-reduced obese women. The purpose of this study was to examine the effect of 8 to 10 weeks of a liquid diet of 420 and 800 kcal/day on non-resting components of the daily caloric expenditure of 13 obese women (mean %FAT ± SD = 45.3±4.7%). Standing energy expenditure (SEE) and the thermic effect of exercise (TEE) (i.e., walking for 6 min at a pace of 2, 2.5, 3, and 3.5 mph) while perfoming the same amount of external work (treadmill grade adjusted for diet-induced weight reduction) were measured by indirect calorimetry prior to (Baseline) and between 8 to 10 weeks of dieting (Diet). The women were 40.5±8.8 years of age and had body weights (WT) of 101.1±17.2 kg. Significant ($p<0.05$) reductions in WT by 13.6 kg and %FAT by 4.8 % occurred during dieting. Lean body mass (LBM) and fat mass were reduced by 3.3 and 10.3 kg, respectively. The dieting SEE was found to be significantly lower by 0.23 kcal/min from baseline values. The dieting TEE of walking at 2, 2.5, and 3 mph were found to be significantly lower than baseline while only respiratory exchange ratio (RER) was significantly reduced while walking at 3.5 mph. Metabolic values corrected for SEE may be found in the following table (N represents the number of subjects who sucessfully completed each walking speed at Baseline; * represents a significant difference from Baseline):

Speed	Condition	N	LO_2/min	mlO_2/kg	mlO_2/LBM	RER	Kcal/min
2	Baseline	13	0.77	7.3	13.7	0.80	3.74
	Diet	13	0.59*	6.2*	10.7*	0.72*	2.72*
2.5	Baseline	12	0.87	8.6	15.5	0.84	3.97
	Diet	12	0.67*	7.7	12.7*	0.76*	3.33*
3	Baseline	9	0.99	10.1	18.0	0.88	4.92
	Diet	9	0.81*	9.6	15.6*	0.79*	3.91*
3.5	Baseline	7	1.38	13.9	25.0	0.91	6.87
	Diet	7	1.08	12.8	20.9	0.82*	5.23

These data suggest that weight loss is associated with significant reductions in the energy cost of the non-resting activities of standing and walking at speeds up to 3 mph. These data may partially explain the reductions in 24-hour energy expenditure and the difficulty obese women have maintaining a reduced weight.

RESTING ENERGY EXPENDITURE MEASUREMENT: PORTABLE ACCELEROMETER VERSUS INDIRECT CALORIMETRY.

Swapan Mookerjee, SUNY College at Brockport, NY.

The Caltrac (Hemokinetics, Madison,WI) is a portable microcomputer developed for measuring energy expenditure (EE). Several studies have examined the efficacy of the Caltrac during exercise but there has been no comparative evaluation of the equations that are used by the instrument itself. EE at rest (EE_{rest}) is estimated using a formula based on age, height, weight, and sex. Since the Caltrac reports EE (rest + activity) it is necessary to examine the accuracy of the EE_{rest} equations since inaccuracies will affect both resting and exercise estimations. Ten male and ten female volunteers,mean ages±SD,(♂ 29.00 ± 4.82;♀ 26.60 ± 3.04) participated in this study after providing written informed consent. Testing was done in two different sessions subjects having been randomly assigned to report in either a fasting (F), or post-prandial condition (PP). Following 30 minutes of quiet rest in a darkened room, measurements of VO_2 were made. There was a statistically significant difference between VO_2F and VO_2PP in both males and females ($p<.05$). There was a statistically significant difference between VO_2F and the EE_{rest} determined via the Caltrac. There were no significant differences between VO_2PP and EE_{rest} in both the groups. A comparative evaluation of the Caltrac equation with regression equations generated from VO_2PP data was carried out to i)analyze the coefficients, and ii)gauge systematic bias. Comparing the coefficients obtained through VO_2PP measurements against the Caltrac formula there was a significant difference ($p<.05$) for Age only in the males whereas none of the variables (Age, Height, and Age) were significantly different in the females. Systematic bias was examined by regressing VO_2PP - EE_{rest} on Height, Weight, and Age collectively. The analysis failed to demonstrate the existence of systematic bias in both the groups. The Caltrac overpredicted fasting EE (♂ 26.9%, ♀ 19%) but showed a non-significant difference between EE_{rest} and post-prandial EE. Analysis of the coefficients and an examination for systematic bias showed a lack of significant differences between EE as determined via indirect calorimetry (VO_2) or the Caltrac, thus supporting the validity of the Caltrac equations in estimating resting post-prandial EE.

THE RELATIONSHIPS OF GENDER, LEVEL OF SPORT INVOLVEMENT, AND PARTICIPATION MOTIVATION TO GOAL ORIENTATION

Sally A. White, University of New Hampshire, Joan L. Duda, Purdue University, and Caroline M. Sullivan, University of New Hampshire

Two major goal perspectives are assumed to relate to how people construe their level of athletic competence, i.e., task and ego involvement. When task-involved, perceived competence is self-referenced and the subjective experience of personal improvement or task mastery underlies subjective success. Perceived competence is normatively-referenced when ego-involved and subjective success entails a favorable comparison of one's ability with others. Duda and Nicholls (1990) have developed the Task and Ego Orientation in Sport Questionnaire (TEOSQ) to assess individual differences in goal orientation or proneness to the different types of involvement. In order to provide further evidence concerning the reliability and construct and predictive validity of the TEOSQ, this study: 1) assessed internal reliability of the two TEOSQ subscales across groups varying in age and competitive involvement, 2) determined whether TEOSQ scores varied as a function of gender and competitive involvement, and 3) examined the relationship between goal orientation and reasons for participating in sport. A random sample of youth (YS), high school (HS), intercollegiate (IS) and recreational (RS) sport participants completed the 13-item TEOSQ. Each group (n = 60) consisted of approximately an equal number of males and females. The latter three groups also were administered a 30-item participation motivation questionnaire (Gill, Gross, and Huddleston, 1983). This instrument was factor analyzed resulting in seven motive categories (i.e., competition, affiliation with friends, team membership, energy release, skill development, fitness, and recognition/status). The task (coeff. alpha = .75 - .87) and ego (coeff. alpha = .77 - .91) orientation subscales demonstrated acceptable internal consistency across groups. Males were significantly higher in ego orientation than females. The highest competitive level group (i.e., IS athletes) was significantly more ego-oriented than YS, HS, or RS athletes. Finally, simple and canonical correlation analyses revealed conceptually consistent relationships between goal orientation and participation motivation. High ego-oriented subjects were more likely to participate in sport for the competition and potential for recognition and status and less likely to emphasize team membership and affiliation. Task orientation positively related to the importance placed on fitness and skill development as reasons for sport participation. These findings suggest that how individuals tend to judge their competence and process success experiences in sport is compatible with why they choose to become involved in sport activities.

THE INFLUENCE OF PLAYER STATUS ON ACHIEVEMENT GOAL ORIENTATIONS, PERCEIVED ABILITY, AND COST-BENEFITS OF INVOLVEMENT.

Linda M. Petlichkoff & Jay L. Larshus, Boise State University, Boise, Idaho.

Recent evidence suggests that player status strongly influences an athlete's perception of ability as well as reasons for involvement (Frazer, 1989; Petlichkoff, 1990). Specifically, results revealed that survivors--athletes who were on the team but did not play in games on a consistent basis--had the lowest self-rating of ability of all groups assessed (starters, nonstarters, dropouts, cuttees). These results suggest that an athlete's perceived ability rating may be influenced or shaped by how much playing time she or he receives. Unfortunately, evidence also suggests that single factor theory assessments may not accurately represent the complex interactions in sport (Petlichkoff, 1988). That is, other factors such as achievement goal orientations and cost-benefits of involvement may also be influenced to a greater or lesser extent by player status than perceived ability. Hence, the purpose of this investigation was to examine the relationship among achievement goal orientations, perceived ability, and cost-benefits of involvement and player status over the course of an interscholastic sport season. Three hundred eighty-four athletes, ranging in age from 14 to 19 years, responded to an Interscholastic Sport Questionnaire on two separate occasions (pre- and postseason) during the 1989-90 school year. The results from a doubly multivariate MANOVA revealed a significant group membership by time of assessment interaction, $\underline{F}(12, 752) = 2.74$, $\underline{p} < .001$. Follow-up discriminant function and univariate analyses indicated that the ability and social approval orientations, perceived ability, and the cost-benefits of involvement measure contributed most to these differences with starters significantly higher on each of these measures than the two remaining groups (primary and secondary substitutes). The results are discussed with regard to the impact of player status and what coaches can do to meet athletes' needs as well as how to enhance his or her players' perceived ability.

CONTROLLED EXERCISE AROUSAL AND COMPETITIVE ANXIETY AS RELATED TO A FOUR CHOICE, PRECUE REACTION-TIME TASK.

Trent E. Gabert and Steven D. Ingraham, University of Oklahoma.

The relationship of arousal as measured by functional workload, and competitive anxiety as measured by the CSAI-2 seem to be logical variables influencing motor performance. Research studies conducted by Siconolfi, Cullinane, Carleton, and Thompson (1982), Lacey and Lacey (1978), Tomporowski and Ellis (1986), Cauraugh and Evans (1989), Burton (1988), and a psychophysiology in exercise and sport review by Hatfield and Landers (1987) indicate strong theoretical implications, but also considerable variation of results. On Day 1, 22 college age, volunteer students completed a questionnaire to assess cardiovascular risk factors, and were pre-tested on a Quinton Monark Bicycle Ergometer Model 845B to determine functional capacity using regression equations from the modified Astrand-Rhyming test. Subjects were randomly assigned to one of three exercise intensity (arousal) levels: 0%, 20%, or 40% functional maximum O_2 uptake (VO_2 max) as predicted from a submaximum cycle ergometer test. On Day 2 Ss were requested to complete the CSAI-2 Inventory; with subscales measuring cognitive anxiety, somatic anxiety, and self-confidence (Martens, et al 1990). Following completion of the anxiety inventory Ss were tested at the specified arousal level (60 rpm, monitored by heart rate - chest telemetry system and metronome), and asked to complete the reaction-time task as programmed on an associated IBM-XT personal computer. The reaction-time task was programmed with a variable foreperiod interval (375 to 1500 ms) and the Ss were required to depress the V,B,N,M keys with index and middle fingers from each hand, according to a 4 choice reaction display. The keyboard was mounted on the bicycle and the monitor was positioned at eye level immediately in front of the bicycle. Ss completed 280 trials with all data captured by the computer. Test time on Day 2 approximated 40 minutes. Analysis from a SAS ANOVA indicated that the main effect of workload did not influence performance ($F=.60$, $p>.56$, 2 and 19 df). Pre-test analysis indicated that the anxiety levels of all three groups for all three components were comparable. The overall relationship of CSAI-2 cognitive anxiety to performance was $r = -.16$; CSAI-2 somatic anxiety to performance was $r = -.15$; and CSAI-2 self-confidence to performance, $r = -.11$. Preliminary conclusions of this study indicate that although the levels of functional arousal and the relationship of the components of the CSAI-2 did not statistically influence performance, the 40% arousal group did show the best reaction time. Future research will investigate higher levels of arousal and self-efficacy along with anxiety as variables influencing performance.

EFFECT OF PROGRESSIVE RELAXATION ON MAXIMAL MUSCLE STRENGTH AND POWER.

E. F. Pierce, N. W. Eastman, Tracey D. Lynn, and R. W. McGowan, University of Richmond, Richmond, Virginia

Anxiety and overactivated states of arousal have been shown to have a deleterious effect on athletic performance. Progressive relaxation (PR) techniques have been subsequently used to control anxiety and to achieve optimal levels of arousal in athletes. However, since PR has been shown to reduce neural activation while strength is enhanced by increased neural activity, the use of PR for activity dependent upon high levels of muscle strength and power may be in question. To examine the effects of PR on maximal muscle strength (MS) and power (MP), 7 trained varsity football players were tested for MS and MP following 3 experimental conditions: 1) arousal (A) 2) progressive relaxation (PR) and 3) control (C). The arousal treatment involved exposure to a film of aggressive football play followed by assessment of MS (1-RM/lbs.) and MP (3-RM/lbs.) accompanied by verbal encouragement, while PR and C conditions were followed by MS and MP assessment in the absence of verbal encouragement. The order of experimental treatments and assessments of MS and MP was randomized. ANOVA procedures indicated that PR significantly reduced pre-MS and pre-MP assessment of heart rate and blood pressure, as compared to A and C conditions. Maximal strength (MS) following PR (300 ± 37.6) was not significantly different from MS following either A (305 ± 39.2) or C (300 ± 39.3) conditions. However, maximal power (MP) was significantly lower following PR (277 ± 26.11) as compared to MP following A (287.14 ± 37.29) and C (286 ± 34.33) conditions. It was concluded that PR can be applied to the training of athletes involved in activities with significant strength demands without reducing maximal muscle strength, but that PR techniques may have a detrimental effect on muscle power.

THE EFFECT OF EXERCISE INTENSITY ON ANXIETY AND MOOD STATES. Ben R. Abadie, Mississippi State University, and Lois S. Hale, The University of Texas of the Permian Basin

There is considerable research support for the generalization that acute changes in mood, particularly state anxiety, are associated with vigorous physical exercise. However, conflicting evidence exists concerning the intensity at which exercise should be performed when attempting to improve psychological states. The purpose of this study was to investigate the effect of varying levels of exercise intensity on state anxiety and other mood states. Twenty-six college students participated in three exercise sessions over a two-week period. During a session, subjects cycled on a Monarch stationary bicycle for 20 minutes at either 60, 75, or 90% of heart rate reserve. The order of trials was randomized. The pedaling cadence was set at 60 rpm. An investigator monitored the heart rate response during exercise by palpation of the radial artery every three minutes. The resistance during the exercise session was dependent on the heart rate response. Subjects completed the Profile of Mood States (POMS) and the state anxiety scale of the State-Trait Anxiety Inventory (STAI-S) just prior to cycling, 5 minutes post-cycling, and 20 minutes post-cycling. Subscales of the POMS included tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. The "right now" response set was employed. One-way ANOVAs conducted to test for possible pre-cycling differences in state anxiety and mood states among exercise intensities indicated no significant differences. The state anxiety scores and the six POMS subscale scores were analyzed using MANOVA with three levels of exercise intensity (60, 75, and 90% of heart rate reserve) and three time periods (pre-cycling, 5 minutes post-cycling, and 20 minutes post-cycling). The results of the MANOVA indicated significant main effects for exercise intensity and for time period, but no significant interactions. Further analysis indicated that exercise intensity affected the mood states of anger-hostility and vigor-activity. Subjects exercising at 75% of heart rate reserve experienced significantly lower levels of anger-hostility than those exercising at 60%. Subjects exercising at 90% experienced significantly lower levels of vigor-activity than those exercising at either 60% or 75%. Exercise intensity did not significantly affect the other mood states measured by POMS or state anxiety. Cycling was associated with changes in mood states. Regardless of exercise intensity, subjects experienced lower levels of state anxiety, tension-anxiety, anger-hostility, and confusion-bewilderment twenty minutes after cycling than prior to cycling. State anxiety, tension-anxiety, and fatigue were significantly lower 20 minutes post-cycling than 5 minutes post-cycling. Generally, the exercise intensities utilized in this study appear to have few significant differential affects on state anxiety and other mood states.

142

SOCIAL FACILITATION OF COLD PRESSOR PAIN TOLERANCE IN COLLEGE AND YOUTH SPORT ATHLETES. Bill Kozar, Boise State University, Russell H. Lord, Eastern Montana College, Keith E. Whitfield, McNeese State University

The effects of the presence of others on human behavior has been well established in both social and sport psychology. Less well established are social facilitation effects which may be exerted on such perceptual experiences as pain. Pain is a fairly common occurrence during both practice and performance of many sport skills. Teammates and coaches are also frequently present during both practice and performance. Sport thus provides an excellent in vivo setting for studying social facilitation and pain attenuation. If pain tolerance is increased due to some social facilitator, this in turn may lead to the enhancement of the athletes performance. However increased persistence or continued exertion may lead to injury, thus producing a detrimental effect. This may be particularly significant in young athletes who not only possess immature physiological and musculoskeletal systems, but lack experience in judging which and how much pain is safe and when does the pain become unsafe? The purpose of this experiment was to study the pain tolerance of athletes under alone, teammates present, and coach present conditions. Subjects were 125 college varsity and youth sport athletes. Testing took place at the practice site shortly before formal practice began or during the practice session. Subjects were randomly assigned to one of the three conditions. The experimental task required the subject to hold his/her hand in a pan of water and ice. Temperature of the ice and water was one to two degrees Celsius. Subjects were instructed to keep their hand in the mixture until "it became too uncomfortable or three minutes had elapsed". A 3x3x2 (Pain attenuation by Competition level by Gender) ANOVA was performed. The analysis revealed a main effect for pain attenuation ($P<.05$). The alone condition resulted in the lowest pain attenuation time while teammates were found to be the most potent social facilitators. A pain attenuation by gender interaction was also found ($P<.05$). Female athletes had lower pain attenuation than males in the alone and coach present condition but teammates presence appeared to facilitate female pain tolerance. Level of competition differences were not found. This may be due to the fact that all athletes were aware of the three minute time limit which may have created an implicit goal for many of the athletes.

CROSS VALIDATION OF THE PHYSICAL SELF-PERCEPTION PROFILE

Christopher Malone and Don R. Kirkendall, State University of New York College at Cortland

The purpose of this study was to investigate the validity of the Physical Self-Perception Profile (PSPP) developed by Fox and Corbin (1989). These authors suggest that the construct of self-esteem is multi-dimensional and perhaps hierarchical. Therefore, when testing self-esteem, it seems reasonable that separate subscales be used to assess each domain or dimension of self-esteem, as well as assessing overall or global self-esteem. Each domain or dimension of self-esteem are comprised of subdomain self-perceptions, such as perceived physical ability or appearance in the physical domain. The PSPP is a test which explores the multi-dimensionality and hierarchical structure of self-esteem by using subscales of the physical domain. If the PSPP can be proven to be valid, insight into the construct of self-esteem can be established as well as providing a bitter understanding of the development of the physical self. The PSPP and the Global Self-Esteem Scale by Rosenberg (1965) were administered to 305 females and 148 males who were entering freshmen in College. The PSPP was designed to measure four subdomains of self-esteem, namely perceived bodily attractiveness, sports competence, physical strength, and physical conditioning. In addition, a general physical self-worth subscale was determined. The current results would seem to validate the construct of the PSPP. Subscale means and standard deviations for females and males were similar to the PSPP distribution. A Principal Components Factor Analysis using varimax rotation produced the same four factors as the PSPP. However some contamination of the physical strength subscale for females and males, may suggest that there exists a fifth factor. The physical self-worth subscale had the highest correlation with global self-esteem, as did the PSPP. And lastly, the subdomains showed stronger associations with physical self-worth than global self-esteem,and the subdomains had higher correlation with physical self-worth than with other subdomains. The differences found by the factor analysis may be related to the make up of the subject pool. Many of the subjects in this investigation were physical education majors or intercollegiate athletes. It appears that the PSPP does in fact use distinct and specific subscales of the subdomain physical self-perception in assessing the construct of self-esteem. Future phases of this study will investigate how physical self-perceptions of physical education majors and intercollegiate athletes relate to their self-esteem and physical self.

ANXIETY IN TYPICAL SPORT SETTINGS: A SURVEY OF ATHLETES IN FIVE SPORTS

J. Dunn and A. Brian Nielsen, University of Alberta

Anxiety in sport has received a great deal of attention from practitioners and researchers alike. When perceived of as a "state of mental uneasiness or distress" it is compelling to believe that such a state is associated with performance changes, positive or negative. Thus far most research has focused upon the factors other than the actual settings and situations perceived by athletes as causing anxiety (Hannin, 1989). As Kroll (1973) and others (Hackfort & Spielberger, 1989) pointed out, there exists a need for research which identifies specific situations in, and across, sports which are perceived as typically anxiety producing (Gould, Horn & Spreeman, 1983). In short, coaches need to know if there are recurring situations in their sport which exacerbate the anxiety levels of their athletes. The purpose of this study was to identify competitive situations which, across a variety of sporting contexts, athletes identify as causing heightened levels of anxiety. A total of 114 athletes (72 males, 42 females) from 5 competitive sports (basketball, ice hockey, field hockey, volleyball and soccer) served as subjects. The athletes were performers from 9 separate teams and were either university varsity level, or the equivalent for their age groups. Each subject was asked to identify up to 5 competitive situations, in their sport, which typically caused them the most personal anxiety. They also were to provide a personal reason for that anxiety. The total number of 491 responses were subject to inductive content analysis to determine if they could be categorized across sports according to recurring or common salient features. Four principle anxiety inducing categories emerged. Ongoing game play situations accounted for 35% of responses. These were offensive (high percentage scoring chance), defensive (covering a good opponent) and injury related. Game/score criticality situations (28% of responses) related to pregame activities, stoppages (service, penalty corners) and within game factors. The 21 percent of responses dealing with coach-related behaviours covered personal decisions, conflicts and feedback on performance. Responses (16%) categorized as miscellaneous concerned officiating, teammate behaviour, audience and opponent characteristics. Overall, analysis supported the existence of a set, or sets, of situations surrounding competition which do typically produce anxiety and which are common across a variety of specific sports settings.

INHABITING LEVEL EFFECTS ON GIRLS' SATISFACTION, INVOLVEMENT, AND AFFECTIVE EXPRESSION IN A GAME SETTING.

Melissa L. Heston, University of Northern Iowa.

The purpose of this study was to investigate the effects of inhabiting level (INH) on the satisfaction (SAT), involvement (INV), and affective expression (AFF) of girls participating in a modified sport game. Inhabiting level varies as a function of the number of active participatory roles in a setting and the number of people available to fill those roles. Underinhabited settings have fewer people than needed to fill such roles, while overinhabited settings have more people than needed. Participants in underinhabited settings generally have more responsibilities and duties to perform, and feel more competent and versatile than participants in overinhabited settings. Boys have been found to prefer underinhabited game settings to overinhabited games settings. However, girls' responses to inhabiting level may be influenced by sex-role stereotypes. Specifically, girls may prefer overinhabited game settings in which there are fewer demands for active participation, allowing them to behave in a manner more consistent with traditional sex-role stereotypes. Thirty 7- to 9-year-old girls were randomly assigned to age-constant teams consisting of three players each. Age-constant teams then competed under conditions of over-, under-, and adequate inhabiting. Inhabiting level was manipulated by varying the number of active roles within modified versions of Keep-away. A forced choice questionnaire was used to assess relative satisfaction with each game. A trained observer assessed each child's level of involvement and affective expression several times during each game. Data were analyzed using repeated-measures ANOVA models. Inhabiting level was found to have a significant effect on SAT, INV, and AFF ($p<.01$). Girls found the underinhabited game significantly more satisfying ($p<0.5$) than either the over- or adequately inhabited games. Girls also displayed significantly more involvement and positive affect ($p<.01$) during the underinhabited game than the overinhabited game. (See Table 1.) These findings are quite similar to those obtained for boys of the same age. Overall, findings concerning the effects of inhabiting level on children in game settings may have important implications for youth sport programs.

Table 1. Mean Scores for SAT, INV, and AFF

	INHABITING LEVEL		
	Over	Adequate	Under
SAT	22.97	27.87	39.07
INV	4.39	4.79	4.77
AFF	3.66	3.94	4.00

SPORT SPECIFIC RESPONSE SET MODIFICATIONS FOR THE MASLACH BURNOUT INVENTORY. Steven D. Houseworth, Kevin L. Burke, Richard Hawes, Richard Calvert. Illinois State University, Normal, IL.

Previous studies examining burnout among athletes have used several indices, but predominantly the Maslach Burnout Inventory (Maslach and Jackson, 1981). The purpose of this study was to revise the MBI instruction and item response set for sport competitive athletes. This follows research on the Test of Attention and Interpersonal Style demonstrating that sport specific response sets improved validity, leading to development of sport specific attention and interpersonal style inventories such as the tennis and batting TAIS. A total of 136 high school and college athletes from 12 different sports were administered the sport adjusted form of the MBI or Sport Burnout Inventory (SBI). Athletes were also grouped according to sports in preseason training, midseason training and competition and, postseason to determine potential differences in perceived burnout due to seasonal stress. Split-half reliability adjusted using Spearman-Brown formula and Cronbach's alpha internal consistency statistics were generally significant. Reliability ranged from 0.78 for emotional exhaustion to 0.55 for personal accomplishment. Cronbach's alpha ranged from 0.62 for emotional exhaustion to 0.52 for personal accomplishment. SBI subscale and overall scores for athletes were significantly (alpha <.05) higher than overall and most occupational group normative scores reported for the MBI. However, high personal accomplishment subscale scores indicated reduced burnout while high emotional exhaustion and depersonalization subscale scores indicated increased burnout, leading to a conclusion that assessment of sport burnout may need to account for individual assessment and performance improvement/decrement features unique to sport. Additionally, female emotional exhaustion subscale scores were significantly higher than male scores but, depersonalization and personal accomplishment subscale scores were not different.

THE EFFECTIVENESS AND TRANSFERABILITY OF FOUR LEARNING STRATEGIES ON ACHIEVEMENT IN SELF-PACED DISCRETE, SERIAL AND CONTINUOUS MOTOR TASK.

Charmaine DeFrancesco, Florida International University

Investigated was the effectiveness and transferability of Readying, Imaging, Focusing, and Five-Step learning strategies on achievement in discrete, serial, and continuous self-paced motor tasks. Eighty undergraduate university students were randomly stratified according to gender into five treatment groups: (a) a Readying strategy group (RS), (b) an Imaging strategy group (IS), a Focusing strategy group (FS), (d) a Five-Step strategy group (FSS), and (e) a Control group (C). A seated-underhand dart-throwing task served as the discrete task; a speed-accuracy apparatus that required learners to perform a number of sequential movements served as the serial task; a pursuit rotor apparatus served as the continuous task; and a modified table tennis serving task was used as the transfer task in this experiment. Following presentation of their respective strategies, all groups performed each of the four tasks. The order of task performance was randomized among subjects except for the transfer task, which was always performed last. ANOVAs indicated that there were no significant differences between the groups in the discrete or continuous task situations. However, significant differences between groups were observed for the serial and transfer task situations. Results determined that the Five-Step and Imagery strategies were significantly better in facilitating achievement than the Readying or Focusing strategies in the serial and transfer task situations. Furthermore, the results suggested that when learners were not reminded to use their respective strategies, the pattern of skill acquisition became more variable between the groups. These results suggested that to determine which strategies are appropriate for various learning situations, the situational demands of the task, the classification of the motor task, and the cognitive demands of the task must be considered.

GENDER COMPARISONS OF PHYSICAL SELF-ESTEEM

Don R. Kirkendall and Christopher Malone, State University of New York College at Cortland

The purpose of this study was to determine what, if any, differences existed between college freshmen males and females in physical self-esteem. Intuitively, it might be thought that females would have a lower physical self-esteem than males since historically females were deprived of physical participation opportunities and were taught that other than having a beautiful body, physical prowess was unimportant for females. Should differences exist, it may be desirable to consider ways of changing this difference since self-esteem has been shown to be an important factor in achievement. The Physical Self-Perception Profile developed by Fox and Corbin (1989) and the Global Self-Esteem Scale by Rosenberg (1965) were administered to 305 females and 148 males who were entering freshmen in College. The Physical Self-Perception Profile was designed to measure four subdomains of self-esteem, namely perceived bodily attractiveness, sports competence, physical strength, and physical conditioning. In addition, a general physical self-worth subscale was determined. A comparison between genders was conducted with the use of a Multivariate Analysis of Variance, followed by unvivariate comparisons for each subscale and the Global Self-Esteem Scale. There was a significant difference ($p=.01$) between the profiles of males and females with the males demonstrating a higher self-perception than the females. The sports competence scale was the largest contributor to this difference, while the perceived bodily attractiveness contributed the least. However, when viewed univariately, each of the four subscales as well as the general physical self-worth subscale were shown to be significantly higher for the males. These results would seem to indicate that we have yet to reach equality between males and females when it comes to physical self-esteem. It appears that work still needs to be done in allowing females to think positively about their physical self. One of the ways this can be done is to further increase the opportunities for female participation and continue to work towards changing societal attitudes concerning female participation in physical activities. The next phase of this study will be to investigate whether these same sex differences about perceptions of physical self-worth remain throughout the College years and determine how these perceptions relate to success on the athletic fields and in the classroom.

GENDER AS A CRITERION IN THE RATING AND SELECTION OF SPORT MANAGEMENT INTERNS. Jacquelyn Cuneen and M. Joy Sidwell, Bowling Green State University.

Several reasons have been suggested for the paucity of women in management positions within sport enterprise. A predominant theory is that gender operates as a status characteristic implying lower competence for females. The purposes of this study were to determine 1) if gender bias operated at the pre-entry level of sport enterprise; 2) if any differences in perceived competence of female and male sport management interns were a function of the gender of the decision-maker and 3) the sport venues where females were perceived as competent to complete an internship. Subjects (N=176) were selected from professional directories and were managerial associates with the typical sport venues that are placement centers for interns enrolled in sport management programs as described by DeSensi, Kelley, Blanton & Beitel (1990). Using Parkhouse & Williams' (1985) contrived status/sex questionnaire as a model, an instrument was developed which contained the names and abridged resumes of six fictitious interns. The names and resumes reflected a "high status" and a "low status" intern of each gender and two "androgynous" interns of each status. The resumes were written and controlled in such a way that the credentials of the high status female were the most impressive. The operationalized definitions of "high" and "low" status were verified by twelve persons who were experienced in reading credentials. Subjects evaluated, on a 7-point Likert scale ranging from weak to strong, each intern's suitability for placement within their organizations then indicated which one of the interns they would select from the pool. Results of MANOVA and Log-Linear Technique indicated that an intern's rating and/or selection was not affected significantly by their gender in any of the sport venues regardless of the gender of the decision-maker. It can be suggested from these findings that, at the pre-entry level, the traditional stereotyping of females as less competent than males in sport management is diminished as a function of credentials, preparation and background.

150

PREDICTORS OF ACADEMIC SUCCESS FOR COLLEGE-BOUND ATHLETES

Terese M. Stratta and Charlotte West, Southern Illinois University at Carbondale

One of the most controversial issues surrounding the NCAA in recent years has been the enforcement of specific eligibility requirements (i.e., Proposition 48) for enhancing the academic success of college-bound athletes. Resurgent opposition to Proposition 48, however, has given impetus to proposed changes in this legislation by the NCAA. While research supports such efforts by showing that single cut-off scores are both invalid and discriminatory in predicting academic success (Ervin, Wilhelm, & Miller, 1987), these studies have been limited in scope. More specifically, they have primarily examined men's revenue-producing sports and narrowly defined the meaning of success. Given these shortcomings and the importance of identifying accurate predictors of academic success in order to assist administrators and coaches in making prudent decisions relative to the admission of college-bound athletes, the purpose of this study was to determine: (1) the pre-facto effects of Proposition 48 on Black and White athletes (N=736) who entered a NCAA Division IAA university between 1975 and 1982, and (2) the best predictors of academic success for athletes in all sports (N=16). Academic success was operationalized as: (1) athletes who exited the institution with a degree (SUCCESS1), and (2) athletes who exited the institution in good standing (SUCCESS2). Data were collected from eligibility forms, squad lists, admissions and records files, and an institutional research database. All SAT scores were converted to the ACT scale resulting in a final standardized test score (FINALACT). Results from discriminant analysis support previous research which suggests that Black athletes, and in particular Black female athletes, experience discriminatory effects. Specifically, the pre-facto effects of Proposition 48 indicate that Black athletes who ultimately succeed would have been deemed academically-ineligible. Overall, of the 70% of Black athletes (N=150) who would have been academically ineligible, 30% exited with a degree and 50% exited in good standing. A combination of HSGPA, HSRANK, and FINALACT were overall best predictors of SUCCESS1 and SUCCESS2; however, these predictors varied across race and sex. These data support the NCAA's recent decision to change academic eligibility entrance requirements. In particular, results from this study can be used by coaches to assist in making prudent decisions relative to the recruitment of "academically-marginal" athletes, while administrators will be able to seriously challenge or propose future legislation concerning academic eligibility requirements. Recommendations for future criteria are presented across race and sex.

PERCEIVED BENEFITS AND CONSEQUENCES OF ANABOLIC STEROID USE IN BODYBUILDING

Tracy Olrich, Michigan State University

Johnon (1985) reported that the use of anabolic steroids and other muscle enhancing drugs is becoming widespread in our society. Although numerous side effects have been attributed to their use, the number of individuals consuming anabolic steroids is on the rise (Klein, 1986). The purpose of this qualitative study was to explore the processes by which the subjects became involved in bodybuilding, and later anabolic steroid use. The subjects for this study, ten male bodybuilders, consisted of five competitive bodybuilders and five non-competitive bodybuilders. All of the subjects, at some point in their involvement in bodybuilding, had used anabolic steroids. An in-depth interview was conducted with each subject. The interview questions covered the subjects prior sport involvement, bodybuilding involvement, anabolic steroid use and the perceived physical and psychological impact of anabolic steroid use. Data resulting from the interviews was content analyzed to identify significant theories. One significant theme found bodybuilding to be perceived as a very positive force in the lives of the subjects. As their physiques developed, subjects gained strength, muscular development, self-confidence and large amounts of positive reinforcement from peer groups. Reasons for beginning anabolic steroid use varied with curiosity and a need to gain muscular size being most prevalent. Anabolic steroid use was a very positive experience for 9 of the 10 subjects. Subjects made large advances in muscle size and development. Subjects gained self-confidence and received even greater amounts of positive reinforcement from peer groups. Minor physical side effects were experienced which reversed upon cessation of drug use. Moral conflict did surface for most subjects at some point due to negative societal perceptions of steroid use. Discussion will focus on the implications of these findings for working with high school athletes in relation to performance-enhancing drug use.

THE EFFECT OF ACADEMIC REQUIREMENTS FOR PARTICIPATION IN EXTRACURRICULAR ACTIVITIES ON FOOTBALL AND VOLLEYBALL TEAMS IN THREE SOUTH CAROLINA SCHOOL DISTRICTS.

Dana S. Espinosa, College of Charleston; Peter J. Graham, University of South Carolina.

The purpose of this study was to investigate the effects of the South Carolina Improvement Act (Academic Requirements) for 1984 for student participation on football and volleyball teams in the Richland I and II, and Charleston school districts. Subjects included all students who competed on the football and volleyball teams (fall 1988) in the aforementioned school districts. Subjects academic record was tracked fall and spring semesters (1988-1989) via computer to determine pass/fail status of each course. Subjects must earn passing grades of 70% in order to maintain eligibility to participate in sport. Subjects were tracked in all courses for the school drop-out rate. Pairwise Comparison analysis was utilized to determine the following: (1) number of subjects who maintained their eligibility status within the sport season; (2) those who lost their eligibility within the sport season; (3) those who lost and regained their eligibility within and out of the sport season; (4) those subjects who failed to regain their eligibility; (5) those subjects who maintained their eligibility and dropped out of school; and (6) those subjects who lost their eligibility and dropped out of school. Data analysis revealed that of the 467 male football subjects studied, 113 (24.20%) were declared ineligible upon conclusion of the 1988 fall season. During the fall 1988 season, 8 of the 94 female volleyball players (8.51%) had lost their eligibility. Seventy-four of the 113 ineligible football subjects regained their eligibility for the 1989 season. Each of the 8 volleyball subjects declared ineligible, earned reinstatement of their eligibility for the 1989 season. Ten of the 121 subjects declared ineligible dropped out of school prior to the start of the 1989 fall season. The current findings suggest that the elevation of South Carolina's academic requirements for participation in interscholastic sport has not resulted in a higher percentage of students being declared ineligible, has not expanded the percentage of students failing to regain lost eligibility, and has not resulted in a greater number of ineligible students dropping out of school. The impact on minority students does not appear greater than previously evidenced. Further, these data may suggest that student-athletes will comply with the minimum standards to qualify for participation in interscholastic sport regardless of scale position established.

DIFFERENTIAL MEDIA COVERAGE OF MEN'S AND WOMEN'S INTERCOLLEGIATE BASKETBALL AND THE UNDERLYING GENDER IDEOLOGY. Elaine Blinde, Rebecca Sankner, Lingling Han, Southern Illinois University-Carbondale; Susan Greendorfer, University of Illinois, Urbana-Champaign.

The present study explores the extent to which media coverage of men's and women's sport reflects the broader gender ideology of the society. This question is of particular significance given both the increase in media coverage of women's sport and the assumed role the media plays in shaping images and perceptions. Using television coverage of men's and women's intercollegiate basketball as our specific context, the purpose of this study was two-fold: (1) identify differences in television coverage of men's and women's basketball, and (2) analyze the assumptions underlying this differential coverage and to locate such assumptions in the broader ideology of the society. Data were derived from a content analysis of 16 televised college basketball games (10 women's and 6 men's) from the 1988-89 and 1989-90 seasons. The content analysis, which examined both verbal commentary and visual portrayals, was performed by two independent investigators to enhance data reliability. Through the usage of a grounded theory perspective, specific coverage differences were collapsed into broader conceptual categories. Analyses led to the identification of the following general coverage patterns -- (a) men's game used as standard for understanding women's game and male athletes used as standard of comparison for female athletes, (b) qualification and trivialization of women's game, and (c) usage of gendered terms and sexist language to depict both the athletes and their actions. Based on these findings, it is suggested that the ideology of sport as a male domain is reinforced by differential media coverage of men's and women's athletic events. Discussion pertaining to this differential coverage considers the social construction of gender roles and the underlying ideological conceptualizations of men and women. Not only does this underlying gender ideology influence media productions, but, as will be shown, it dictates practices in sport and physical education contexts as well.

ATHLETICS IN THE SOCIAL VALUE SYSTEM OF HIGH SCHOOL GIRLS.

Alan D. Goldberg, Ph.D. and Timothy J.L. Chandler, Ph.D., Syracuse University.

There continues to be disagreement about the potential role conflict experienced by women who, having chosen to participate in the traditionally defined male domain of competitive athletics, must balance the roles of female and athlete (Desertrain and Weiss, 1988; Jackson and Marsh, 1986; Watson, 1987). The purpose of this study was to identify the current criteria for social status among adolescent females with particular reference to participation in inter-scholastic athletics. 628 female students in four Upstate New York High Schools were administered a questionnaire to assess their perceptions of commitment to a variety of roles/activities. Specifically students were asked to rate role/activity choices using a 5 point Likert scale, thus enabling participants to identify multiple roles as being important/unimportant to their perceptions of high school social status. Data were analyzed using a series of chi-squares with significance established at the .01 level. 24.4% of the sample saw little importance in being remembered as an outstanding athlete, whereas only 14.7% saw little importance in being remembered as an outstanding student. Both athletic participants and non-participants believed that their parents attached significantly different degrees of importance to athletics and leadership in activities. There were no significant differences between participants and non participants who saw being a member of the leading group as the major source of peer approval. Results of the study suggest that athletic participation may be a subset of a more general category characterized by active participation in the life of the school. High school females exhibited multi-dimensional self-identities with their self-identities differing in relation to their involvement in sports and the social groups used as their point of reference. Such findings are consistent with those of Eckert (1989) has identified two broad categories of high school students labelled "jocks" and "burnouts" whose distinguishing characteristics are their level of involvement in the activities and culture of the school. Suggestions for further research center on exploring the relationships between multiple role identities and such variables as academic achievement, personal development, race and social class. Such research may also help in addressing the issue raised by Hall (1988) that the question of conflict between gender and sports culture has been asked only in the realm of the feminine, because culture is defined largely in masculine terms.

TEACHERS AND COACHES AT RISK: PERSONAL INSURANCE POLICIES MAY HELP.

Cheryl A. Kolander, University of Louisville; Joy L. Hendrick, State University College at Cortland; Joni L. Grayson, Robinson-Conner Insurance, Louisville.

Physical education teacher/coaches have a great deal of interpersonal contact with large numbers of people. This alone increases the potential for liability claims to be leveled against them. They should know when a personal insurance policy may respond since a school corporation's insurance policy may not protect them in all school situations. Do professional preparation programs provide future physical education teachers with information regarding the response of personal insurance policies to liability claims? Do students know about the protection offered by Personal Auto, Homeowners/Tenant, and Personal Umbrella policies? The purpose of this study was to determine the knowledge level of preservice physical education teacher/coaches regarding individual risk management techniques. Subjects (n=91) were senior physical education majors enrolled during the fall semester in a state college in the northeast. Ages ranged from 20 to 28 ($\bar{X}$ = 21.95) with 63 males and 28 females. A 30-item forced choice questionnaire was administered during a single class period. The intraclass test re-test reliability, based on a sample of 52 junior physical education majors, was R=.89. The survey questions were grouped into the following categories: 1) Personal Umbrella, 2) Homeowners/Tenant, 3) Personal Auto, 4) General Insurance Issues, and 5) specific teacher/coach liability coverage. It was found that senior physical educators had limited knowledge about insurance with approximately one-half of students responding correctly (56.48, 51.70, 44.30, and 54.64 per cent for categories 1-4 respectively). However, their knowledge of liability coverage for specific teacher/coach situations was greater (84.78 per cent of students responded correctly in this category). It was noted that 57 per cent were unaware that schools may not provide coverage in certain school related situations. These results suggest that physical education programs appear to educate future teacher/coaches about specific liability issues. However, students lack the knowledge of the protection provided by individual insurance policies.

RECRUITMENT AND SELECTION OF ATHLETES IN THE SOVIET UNION.

Stephen C. Jefferies, Central Washington University.

The purpose of this study was to examine Soviet methods of recruiting and selecting athletes. Administrators, teachers, coaches, and emigre coaches were interviewed in the USSR, in the USA and in Israel. Although the government sport authorities are responsible for ensuring the development of a qualified athletic reserve, a multitiude of sport organizations compete in the nationwide search for athletically talented young people. These organizations administer a system of mass recruitment, practically made possible because of the existence of thousands of specialized training facilities staffed by professionally trained coaches offering training at no cost. The diversity of recruitment methods makes it unlikely that many athletically gifted young people escape detection. Public school physical educators permit coaches to observe their classes but rarely participate in the preparation of young athletes. Because the prestige of each sport organization, and the professional advancement of its coaches is almost solely dependent on athletic results, both are highly motivated to recruit the best talent. Prediction of athletic potential is complicated by the fact that the average training period, which from beginning to peak performance is 8-10 years, encompasses the years of peak growth and development. It is also common for athletes to switch sports several times during their youth. Initial selection is based more on the child's motivation to participate than on existing ability, and coaches rely more on intuition and experience rather than objective testing methods. Cutting athletes is avoided whenever possible because of the fear of eliminating a potential champion. The appearance (erroneous in most sports) that athletes are peaking at a younger age has led to earlier sport specialization, which in turn has stirred concern regarding the potentially debilitating impact of "premature sport specialization." Younger recruitment has also been forced on coaches because of the competition between organizations for the most talented young people.

"THE BENCH": AN EXPLORATORY STUDY OF SPORT TEAM SOCIALIZATION

M.L. De Furia, Syracuse University, Bernard Oliver & David Bacharach, St. Cloud State University

The fanfare of traditional rivalries in college athletics and society's persistent fascination with accumulated win-loss records has obscured any interest in the important sociological and psychological properties and implications associated with team sport participation such as group formation, self-esteem and peer acceptance as perceived by the individual participant in the competitive sports realm. Team sport research has concentrated on the team as a unit (Loy, et.al., 1972; Peterson & Martens, 1972; and Vos & Brinkman, 1970). Orlick (1978) suggested that this unit may be divided into subunits with individual goals and separate characteristcs. While a number of studies have explored the socio-psychological aspects of sports (Fine, 1986; Glancy, 1986; and O'Block & Evans, 1985), few research studies exist relating to players' perceptions of their sports experience in highly competitive or organized athletics. Realizing how players make sense of their involvement may be useful in understanding their integration into a college athletic program and in enhancing participation levels and contributions to the team. This study reviewed team dynamics of a college varsity women's volleyball program and focused on: 1) identifying certain membership parameters including year in school, playing position, athletic scholarship recipients and starter status, 2) delineating espoused value systems and purported female philosophy of sport participation and 3) a particular sub-group of the athletic team, the non-starting members or "benchies." Data were collected by participant observation, personal accounts, individual interviews, attendance records and competition statistics. This qualitative methodology elicited detailed and descriptive accounts of players' experiences which were then organized into frequency categories based on the constant comparative method (Glaser and Strauss, 1971) and analyzed using grounded theory as explicated by Goffman's Stigma (1963). Ability level and playing experience were perceived by athletes as important considerations when selecting the starting line up in volleyball. Upper class players, whether on scholarship or not, kept underclassmen "in their place." Understanding the meaning of "team spirit" and goal setting and achievement helped players formulate the proper "attitude" toward this group effort. Findings suggest the use of participant observation and additional research on female athletics would be beneficial to coaches, parents, administrators and athletes toward understanding the context of team sport participation. Although it is unrealistic to generalize from such a small, homogenous sample, this study postulates a more humanistic approach to the social organization of athletic teams.

SOCIAL POWER ORIENTATION OF MALE AND FEMALE HIGH SCHOOL BASKETALL COACHES

Elizabeth R. Hall, Texas Tech University
J. Edward Burkhardt, Southwest Texas State University.

The interpersonal relationship between coaches and players has come under increased public scrutiny as a result of the amount of publicity surrounding the antisocial behavior of a few high visibility athletes. Questions are emerging concerning the amount and type of influence a coach does and should exert over the athletes in her/his charge. An analysis and understanding of this influence could help coaches better use the influence that they have, as well as begin to shed light on the relative merits of various sources of influence in obtaining the goals of athletic participation. The purpose of this study is to better understand compliance influence in the sport environment by determining the base of social power most used by high school coaches. High school coaches in Texas comprised a stratified random sample (N=300). Coaches were asked to respond to the Coaches Social Power Inventory, which was constructed by the author, to measure projected courses of influence when faced with a hypothetical circumstances involving a coach and his/her team. Surveys were mailed with a request to return the enclosed postcard printed to be used for returning responses. One hundred and ninety seven responses were received for a return rate of .66. Content validity of the survey was established by two independent panels of judges (N=15 and N=10). The judges were asked to classify items into one of the five power categories and those scenarios reaching 90% agreement after one edition and reevaluation were maintained for the final survey form. Ninety-two percent of the coaches surveyed could be classified into a primarily coercive (C=46.3%) orientation or a primarily expert (E=45.6%) orientation. Approximate significance of contingency coefficient follow for: classification of school by size=.48; sex of coach=.30; sex of team=.87; years of coaching=.24; win-loss record=.27, career win-loss=.67. Chi square statistic revealed no significant differences with the exception of sex of team. It appears that choice of social influence orientation may be a function of the sex of the team and independent of the sex of the coach. This finding relates, however, only to male coaches coaching female teams, as no instances were reported in which a female coached a male team. The ability to classify 92% of coaches into either expert or coercive orientations provides an interesting contrast for the study of the compliance environment created by coaches. Coercive source of power has been termed "socially dependent with surveillance" and expert power has been termed "socially dependent without surveillance". Implications center around the possibility that for one set of coaches (those classified as using primarily expert power) players may be counted on to exhibit desired behavior regardless of the presence or absence of the coach. Those coaches dependent upon a coercive power relationship with players, on the other hand, will require surveillance in order to assure compliance.

ATTITUDES TOWARD STEROID USE AMONG AMATEUR ATHLETES

Jerald D. Floyd, Belinda M. Wholeben, Corenna C. Cummings
Northern Illinois University

The use of steroids, particularly among school-aged individuals, has received considerable attention and debate. Buckley et al. (1988) report that at least 6.6% of male high school seniors had used or were currently using steroids. Two-thirds of these students began their steroid use when they were 16 years of age or younger. The State Legislature of Illinois has mandated instruction on steroid use for all public school students in grades 7 through 12 (HB2626). Public officials and school personnel are in need of accurate information regarding the beliefs and behavior of the population of students to whom these programs will be addressed. The purpose of this study is to secure data on the knowledge and attitudes of school-aged athletes concerning steroid use. Therefore, a survey was conducted at the Prairie State Games, an annual, olympic style, amateur athletic competition in Illinois. The educational significance of this study lies in its ability to provide a portion of the data required for school personnel and other public officials to make informed policy and curricular decisions. Fourteen items comprised the Steroid Attitude Scale. Participants responded on a 5-point Likert scale (strongly disagree to strongly agree). Demographic information was also collected. Participation in the study was completely voluntary and anonymous. A total of 286 athletes participated in the study. Response frequencies were calculated for all items for males and females separately and combined. One-way analyses of variance were calculated comparing male and female responses on each item and on the total score. Athletes agreed with all negative items about steroid use and disagreed with all positively stated items about steroid use. Comparisons were made between males and females concerning the *intensity* of disagreement or agreement within items. Females indicated more negative attitudes toward steroid use. The females more strongly agreed that steroid use has dangerous effects on body functions, risks outweigh benefits, athletes do not have to take steroids to be competitive, and it's *not* OK to use steroids even if it means winning a championship or obtaining a scholarship.

FACTORS WHICH INFLUENCE JOB STABILITY IN COLLEGE FOOTBALL COACHING.

John D. Vraa, Hamline University, Cynthia L. Pemberton, University of Missouri-Kansas City, Melessa A. Parker and Sandra A. Modisett, University of North Dakota.

The profession of intercollegiate football coaching is in a state of great instability with numerous football coaches being fired, resigning under pressure or moving on to "better" jobs each year (College Football, 1988). The purpose of this study was to determine the factors which were perceived by coaches and athletic directors to be of greatest importance relative to job stability. Subjects were intercollegiate football coaches ($n=106$) and intercollegiate athletic directors ($n=138$) from the NCAA Divisions IA, IAA, II and III. Subjects were asked to complete a questionnaire which asked them to rate 20 coaching responsibility items on degree of importance relative to job stability. The coaching responsibility items were separated into five categories: coaching skills, recruiting, outcome characteristics, responsibility for players, and communication skills and were rated on a five point likert scale. The five categories were determined using factor analysis on the original 20 coaching responsibility items. MANOVA was conducted to determine if differences between NCAA Divisions and between coaches and athletic directors existed for the coaching responsibility categories. The outcome characteristics category was perceived by subjects to be significantly less important than the other four categories, $F(3,206)=22.53, p<.001$. Responses according to NCAA Divisions revealed that subjects in NCAA Division III perceived the outcome characteristics category to be significantly less important than did subjects in NCAA Divisions II, IAA, and IA, $F(3,216)=23.28, p<.001$. NCAA Division II subjects perceived the outcome characteristics category to be significantly less important than did subjects in NCAA Divisions IAA and IA, $F(2,216)=23.28, p<.001$. Responses indicated that athletic directors perceived the recruiting category, $F(1,238)=15.22$, $p<.001$, and the responsibility for players category, $F(1,236)=14.89$, $p<.001$, to be more important relative to job stability than did coaches, and coaches perceived the outcome characteristics category, $F(1,216)=45.69, p<.001$, to be more important relative to job stability that did athletic directors. Differences by NCAA Division existed for the outcome characteristics category, while differences between coaches and athletic directors existed in the recruiting category, the responsibility for players category, and the outcome characteristics category.

HEALTHY PLEASURES: A NEW PARADIGM FOR PROMOTING EXERCISE BEHAVIOR

Mary A. Steinhardt and Laura F. Bates, The University of Texas at Austin

Wellness has become highly valued in our society. Although "health" and "wellness" are commonly believed to be beneficial, there are indications that our current societal health focus may not, in some ways, be entirely healthy. Several researchers have recently remarked that the health promotion field has done more to manipulate and induce individual behavior change, than to encourage people to adopt positive behaviors as a means of taking care of themselves. Individuals are taught to value external control, discipline, self-restraint and denial. Societal evidence of this perspective is manifested by those individuals who exercise excessively or who constantly worry about not having enough discipline to exercise on a regular basis. This study proposes a model of wellness that is represented by a continuum illustrating two juxtaposed orientations towards health behavior. One end is labeled "self-control," while the opposing end is termed "self-trust." The "self-trusting" perspective promotes the enjoyment of physical activity (process) rather than the rewards gained from participation (product). The purpose of our study was to determine the relationship of general self-esteem, physical self-esteem, positive self-reinforcement, and outcome-expectancy values (pleasure, appearance, social, athletic, disease prevention) to the dependent variables, "Exercise" and "Wellness". A high score on the exercise or wellness scale indicated a control orientation while a low score was indicative of a self-trust orientation. Subjects included students enrolled in university physical activity classes (N=154), a health promotion majors class (N=52), and a commercial aerobic dance facility (N=67). Stepwise regression analysis indicated that outcome-expectancy values significantly (R^2=.26;$p<.001$) predicted an individual's score on the exercise scale. Individuals who exercised for appearance (ß=.40) and athletic (ß=.30) reasons had higher control scores on the exercise scale, whereas individuals who exercised for pleasure (ß=-.19) scored lower (less control) on the scale. High control scores on wellness (ß=-.65) and exercise (ß=-.11) were indicative of individuals who were significantly (R^2=.49;$p<.001$) less likely to reinforce their own behavior. Also, individuals with a high control score on the wellness scale (ß=-.74) had significantly lower general self-esteem (R^2=.55;$p<.001$) and physical self-esteem (ß=-.57;R^2=.38;$p<.001$). These data illustrate the need for health promotion professionals to consider the healthy pleasures paradigm for promoting exercise behavior.

LIVING THE DREAM . . . A SOCIOHISTORICAL ANALYSIS OF PROFESSIONAL WOMEN BASEBALL PLAYERS 1940 - 1950

Karen H. Weiller, University of North Texas;
Catriona T. Higgs, Slippery Rock University

It is every elite athlete's dream to play their sport at a professional level. This dream became a reality in the 1940's for the 600 members of the All American Girls Professional Baseball League (AAGPBL), established by Philip K. Wrigley during the war years to preserve the game of baseball. Wrigley took the very finest women softball players from across the country and brought them together for what was to be a decade of outstanding championship style baseball. This investigation was designed to elicit information pertaining to the experiences of women who played professional baseball during the war years. Data were collected by means of an open ended interview schedule. Analysis of the data revealed some interesting and extremely insightful information regarding the total experiences of these elite women athletes. Included were questions regarding reasons for becoming involved in the AAGPBL, the position of women in sport and society during the 1940's, and restrictions placed upon these elite women athletes during this period. Though they were called "The Girls of Summer," or "The Belles of the Ball Game," these women contributed to a special and unique period in the development of women's sports.

AMERICAN WOMEN ENTER THE OLYMPIC MOVEMENT: COINCIDENCE OR DESIGN

Paula D. Welch, University of Florida

The purpose of the study was to determine if the first generation of American women Olympians calculated their entry into the Olympic movement or if their presence in the 1900 Paris Olympic Games was a coincidence. Furthermore, an explanation of the presence of American women at the 1900 Olympics was sought. The historical research methods included a content analysis of newspapers, government documents, official Olympic reports, and personal interviews with descendants of Olympians. Synthesis of the evidence and interpretation of facts were used in the procedures. The seven Americans who entered the Paris Olympics matched the profile of late 19th century scions of wealth. They joined social clubs, studied art, music, literature, language, and some enhanced their studies in Europe. America's first women Olympians blended into the Olympic movement without team status, uniforms, fanfare or recognition by the American Olympic Committee (AOC). Women had gained entry into the Olympic Games after the dismissal of Baron Pierre de Coubertin and his Olympic Organizing Committee. Coubertin's political views were in conflict with those of the French government at the turn of the century. The 1900 World's Fair in Paris coincided with the Olympics and so overshadowed the Olympics that the sports events were referred to as the International Contests. Two American women participated in tennis, while the remainder entered the Olympic golf tournament. The tennis players, Marion and Georgina Jones, participated in the All-England Championships and then went to Paris for the Olympic tournament. They were not in Europe for the primary purpose of entering the Olympic Games. The golfers were in Europe for varied reasons. Mary and Margaret Abbott, the first mother-daughter Olympic combination, were in Europe so that Mrs. Mary Abbott could complete a book and Margaret could study art and French. Polly Whittier was also in Europe for educational purposes while Daria Pratt was in France planning her daughter's wedding. Ellen Ridgway was a long time resident of Paris. The presence of Americans in the Olympic golf competition was a coincidence rather than a calculated plan.

STUDENT INTERACTION IN CONTACT AQUATIC ACTIVITY.

Susan T. Dempf, Syracuse University

The aquatic learning environment has long posed problems for instructors and students. Most of these difficulties have been physical in nature; cold water temperatures, the water depth in pools where learn-to-swim programs were conducted, and the accessibility of pools to the elderly and handicapped are examples of such. But the physical comforts of the students are not the only issues which need to be addressed. In contact aquatic activity classes, such as American Red Cross Lifeguard Training, students are asked and expected to disregard the socially constructed norms of interpersonal contact within an educational setting. Lifeguard candidates are expected to practice skills which require physical contact both on the deck and in the water with individuals unknown to them. While this is occuring the major objective is to learn and ultimately master those skills which will be requaired of them when placed in the role of the professional lifeguard. Through a survey students in an American Red Cross Lifeguard Training class were asked to describe their attitudes, apprehensions and concerns regarding the portion of the class requiring interpersonal contact. Likert and open ended questions were used to solicit student responses. Analysis of variance and correlation coefficients were utilized to analyse the data. Responses to the open ended questions gave further depth to the findings and offers the students verbal perspective. The findings indicated three major areas of concern for the students: homophobia, inappropriate touch and practice partner selection. The latter of which was linked with the aforementioned concerns. All of these correlated highly with the concept of personal space. Thus supporting Altman's (1975) suggestion that personal space acts as a defense mechanism individuals employ in order to maintain their sense of privacy. Homophobia, literally defined as fear of the same, was one of the most pronounced concerns of the male students surveyed. For the male student the "worst" possible partnering prospect was that of the unfamiliar male. Land drills were the most uncomfortable situation experienced by the men. The highest reported levels of self-consciousness occured at these instances. Inappropriate touch was the greatest fear expressed by the women in the class. Among females, the "worst" possible partner prospect was the unknown male. Interestingly, the women differentiated among victim and rescuer opportunities. Saving a male was more "acceptable" than being saved. Men however, did express concern over the misinterpretation of "accidental inapprpriate touch" particularly when first learning the skill or doing dry land drills.

"THE STUDY OF EQUITY-BASED HIRING TRENDS FOR HIGH SCHOOL PHYSICAL EDUCATION TEACHERS IN THE UNITED STATES."

Bonnie J. Hultstrand, University of Idaho.

Research has documented the fact that women in the sport leadership roles of coaching, officiating, and administrating have declined quite drastically since the passage and implementation of Title IX. But, what has been occurring in the hiring of women physical educators in the secondary schools? Is the leadership role for women in teaching also declining due to Title IX and its coeducational physical education requirement? This study investigated the employment trends of high school physical education teachers in randomly selected states from various regions of the country. The purpose of the study was to: 1) identify the overall hiring trends and changes for the period of 1975-1988 (pre-Title IX to the present); 2) identify specific states or regions of the country that have an inequity in the employment of high school physical education teachers; 3) identify the hiring practices according to the size of the school districts. Two states from each of the six AAHPERD regions were randomly selected to participate in the study. Male and female full time high school physical education teachers were recorded from state files for each state at four year increments --- 1975, 1979, 1983, 1987. Wherever possible, the data was separated into school size. The data was compiled and analyzed for each state and also as a total compilation. Using descriptive statistical analysis, the results of the study show that over: 1) There has been a 19.5% decrease in full-time positions in physical education in the past twelve years. 2) Within this 19.5% decline in numbers, 60% of the positions lost were female positions and 40% were male positions. 3) The percentile ratio of male to female in high school physical education positions changed from 55:45 in 1975-76 to 60:40 in 1987-88. These decreases show cause for concern in our profession. Further study is needed to find the reasons for the decreases in full time high school physical education positions and, in particular, women.

USING SOCIAL LEARNING THEORY TO PREDICT PHYSICAL FITNESS.

Daniel D. Adame, Steven P. Cole, Thomas C. Johnson, Stephen Nowicki, and Haukur Matthiasson, Emory University, Atlanta, Georgia; Maher A. Abbas, Stanford University, Stanford, California.

Because of the declining levels of physical fitness among the nation's youth, the search for those factors associated with improving fitness has become all the more important. In the present study, Rotter's social learning theory was used to guide the selection of those variables that would predict fitness performance. These included generalized beliefs concerning individuals' perception of control over the outcomes of their efforts, the value they placed on important aspects of fitness, and the conditions under which fitness testing takes place. Fitness testing (heart rate, blood pressure, weight, height, muscle strength, percent body fat composition, flexibility, muscle endurance, and aerobic power) was completed on 451 college freshmen students. They took the tests under one of three conditions that varied in gender composition. It was predicted by social learning theory and found (using ANOVA) that beliefs about control, the value placed on fitness, conditions under which testing took place all contributed significantly to the final fitness performance. These results suggest strongly that efforts to improve fitness need to focus on personality and motivational variables largely overlooked up to now. Finally, social learning theory may provide a viable framework to guide the future study of fitness.

ETHNIC IDENTITY AND ETHNICITY OF SOCCER CLUBS IN AUSTRALIA.

Christopher Hallinan, University of Alabama and
Brian Downes, University of Wollongong.

While soccer is not considered the major or primary sport of the core society, it is the primary or major sport in most of the European countries from where the non Anglo population emigrated. The purpose of this paper was to investigate the nature of ethnicity/assimilation among non Anglo soccer clubs in Illawarra (a metropolitan area in which the population comprises 28% who were overseas - born and a further 23.4% whose parents were born overseas) and examine the extent to which soccer had provided for the structural assimilation of members into the core society or served as a site for the construction and maintenance of ethnic identities. Two questions guided the investigation. Do the 24 soccer teams representing 7 ethnic entities (Macedonian, Italian, Croatian, Spanish, Greek, Serbian, Maltese) reflect the core society's perception of their cultural separateness? What structural or functional forces explain such influence? The results showed that while assimilation of players from various ethnic outgroups was widespread among teams, this action was done to heighten the winning capacity of the team and, in turn, the strength of the ethnic identity. That is, ethnic solidarity was not fortified by the singularity of players' ethnic membership, but rather by recruitment of the best available players so as to enhance the prospect of a winning identity. This identity was expressed in celebrative form by the club supporters (management & spectators) who, unlike the players, were of the same ethnic membership as the club. For example, a Greek team may be represented by a ethnic mixture of players but any victory will be portrayed as a Greek win - particularly by supporters. If the teams were sociopolitical adversaries (e.g. Croatian vs Serbian), then ethnic membership was of a heightened significance. These identity strategies were invoked by teams at all levels of competition (i.e., Division 1 through Division 4). It was thus concluded that soccer served as a site for the enhancement of the differential ethnic identities and that any structural assimilation into the core society that may emanate was likely to occur at other sites, e.g., the workplace.

A SOCIOLOGY OF AUTO-RACING IN THE FILM MEDIUM - "GRAND PRIX" TO "DAYS OF THUNDER"

Scott A.G.M. Crawford, Eastern Illinois University

The definitive bibliography of athletic film scenarios, *Sports Films: A Complete Reference* by Zucker and Babich, identifies 224 movies in the category of "Cars and Motorcycles." The purpose of this study was to analyze a representational selection of auto-racing movies within a modernistic and contemporary time frame, i.e. 1966-1990. The selected films were: *Grand Prix* (1966), *A Man and a Woman* (1966), *Winning* (1969), *LeMans* (1971), *Cannonball* (1976), *Bobby Deerfield* (1977), *Greased Lightning* (1977), *Six Pack* (1962), *Heart Like a Wheel* (1983), and *Days of Thunder* (1990). The umbrella term, auto-racing, embraces a variety of types of auto-racing from traditional European Grand Prix and saloon car racing to American specialized/adaptations such as the Indianapolis 500 and the NASCAR series. The review identifies key universal ingredients of the successful formula followed within this genre. The mystique of the driver, the exhilaration of speed, the mortal parameters of the sport, the drama of the action and the sustained rituals of the race, the circuit, the pit crew and the crowd. The major sociological questions addressed focus on sports issues and the depth/reality of their treatment in what, after all, is only a sphere of public entertainment - the movie. What of gender? *Heart Like a Wheel* was a pioneering venture as it described a female hot rod driver, Shirley Muldowney. What of the Afro-American? *Greased Lightning*, despite the comedic wildness of star Richard Pryor, examined the racism that confronted Wendall Scott as a NASCAR racer. What of concepts of self-aggrandizement over team effort? Does sportsmanship and fair play have any part in a technologically-intensive world dominated by machines and corporate sponsorship? What accurate insights do such films provide on the sub-culture of auto-racing? The films surveyed, although they promote the thrills and vertigo attractions of high speed action, are much more than mere promotional godsends for the auto-racing industry. These films, in an analogous sense, paint a vivid picture of parts of a real world. The parts, it is true, are juxtaposed by the whims of a director and yet they provide the cinema viewer (nearly 31 million a year *real* spectators in the USA) with some appreciation of a sport where life can fly by at 3 miles a minute.

SYMPOSIUM: WHAT'S THE USE OF TRYING: A MODEL FOR EXPLAINING LEARNED HELPLESSNESS IN PHYSICAL EDUCATION

The purpose of this symposium is to describe the dynamics of the learned helpless syndrome in physical education. Specific emphasis will be placed on ways of identifying the learned helpless child and to provide viable intervention strategies for abating the conditions of learned helplessness. Tom Martinek discusses a model explaining how learned helplessness is acquired by young children and how it can affect performance and behavior in physical education. Joseph Griffith presents a study describing the attribution patterns of learned helpless children. In addition, the study describes their levels of persistence at motor tasks during physical education instruction. Mary Walling presents an ethnographic study describing the school-life of the learned helpless middle school child. Accounts of the student's social relations with physical education and classroom teachers and peers are the focal points of the study. Lastly, Meg Sheehan, an elementary physical education specialist, presents findings from an action research study conducted with her own physical education classes. The study looks at the effects of an attributional re-training on changing the feeling of learned helplessness in learning disabled students participating in her physical education classes.

A MODEL FOR EXPLAINING LEARNED HELPLESSNESS IN PHYSICAL EDUCATION.

Thomas J. Martinek, The University of North Carolina at Greensboro.

The purpose of the paper is to describe a model from which the phenomenon of learned helplessness can be partially explained in physical education. The model was adapted from Seligman's and suggests that three main processes are involved in the acquisition of a learned helpless state. The first is the students effort to examine what it takes to succeed at a task. Included in this is the process of identifying the criteria for successful performance. Part of this involves the student's effort to find if there are options or other criteria to a given task. The second part of the model pertains to the student's effort to meet the criteria. The third part is the teacher's evaluation of the students performance. If the effort or the outcome has little effect on the teacher's evaluation of the response, the student begins to acquire a feeling of learned helplessness. The conclusion of this paper will suggest some instructional strategies that can be used to help students overcome feelings of learned helplessness. These strategies focus on modifying attributions made during various learning tasks in physical education.

BEST COPY AVAILABLE

CAUSAL ATTRIBUTIONS OF PERFORMANCE OUTCOMES AND TASK PERSISTENCE OF LEARNED HELPLESS STUDENTS.

Joseph B. Griffith, III, The University of North Carolina at Greensboro.

The purpose of this study is to describe the causal attributions made by learned helpless students toward their performance outcomes during physical education instruction. In addition, their level of persistence on motor tasks was also determined. The students in this study were 8 learned helpless students from kindergarten through third grade. In addition, students who were found not to have learned helpless characteristics served as a control group. Students were asked to view their performance which were depicted on video episodes. They were asked to describe how they thought they did on each of the tasks and to give the reasons for their performance. Responses were classified into one of four attributional categories: a) personal, b) teacher, c) environmental, and d) complex. Persistence on the motor tasks were also determined by looking at the number of times they would try at a task, both after failure and success attempts. Learned helpless student's attributions were significantly different from those of the control students. They attributed their failures to both personal and environmental attributes much more so than the control students. There were no differences found between the two groups for successful attempts. It was also found that learned helpless students were less persistent on motor tasks, especially for those where failure was experienced.

LEARNED HELPLESSNESS: A CASE STUDY OF A SIXTH GRADE PHYSICAL EDUCATION STUDENT.

Mary D. Walling, Purdue University.

The purpose of this study was to focus on one extreme case of learned helplessness in a sixth grade student. Using the format of a case study, information about the student was gathered through a data file of background information on the child, observation of the student in various classes throughout the school day, and personal interviews with the subject and her teachers. A second purpose of the study was to analyze the collected data and develop an intervention program to alleviate the learned helpless condition of the subject. A format of observing two days a week for two weeks was used initially to observe the subject in various academic settings including math class, science class, physical education class, and the non-classroom setting of lunch. In addition, once or twice a week the researcher interviewed the subject and the individual teachers who were involved in the observation periods. Themes which were frequently stated and restated in the data were selected. The themes identified were related personal characteristics, relationships with family members, relationships with teachers and peers, and self-perceptions of intellectual prowess.

THE EFFECTS OF AN ATTRIBUTIONAL RE-TRAINING INTERVENTION PLAN ON EXCEPTIONAL CHILDREN IN PHYSICAL EDUCATION.

Anne M. Sheehan, Altamahaw Ossipee Elementary School, North Carolina.

The primary purpose of this present study was to examine the effects of an attributional re-training intervention plan on achievement responsibility of exceptional children in elementary physical education. The study was conducted over a four week period. The subjects consisted of 10 students. Five were fifth grade males, four were 4th grade students (3 males & 1 female) and one was a 2nd grade male student. Two of the students were classified as emotionally handicapped while the others were classified as learning disabled. The students were randomly placed into either an experimental or control group. The two groups were intact physical education classes and were taught by the investigator of the study. The treatment condition focused primarily on giving special corrective feedback pertaining to skill and behavior responses. Specifically, all feedback was given in a positive and facilitative manner. Any praise given to the students was stated so that the student felt responsible for the successful behavior. Failures were only acknowledged as "flukes" or the result of some external factor such as the task being too difficult. The control group received "regular" instruction. The results showed strong effects of the treatment on the achievement responsibility of the exceptional students in this study.

PREOPERATIVE AND POSTOPERATIVE ASSESSMENT OF SURGICAL INTERVENTION FOR EQUINUS GAIT IN CHILDREN WITH CEREBRAL PALSY.

Bruce Etnyre, Rice University; Carol S. Chambers, and Nancy H. Scarborough, Shriner's Hospital for Crippled Children

The purpose of this study was to compare the effects of different methods of surgical correction for equinus gait in children with cerebral palsy using pre- and postoperative linear measurements of gait, passive range of dorsiflexion (PRD) and dynamic ankle joint motion (DAJM) analysis. Common methods of surgical correction include resectioning the Achilles' tendon, or cutting the gastrocnemius muscle from the Achilles' tendon. Twenty-four patients (mean age = 7 years 6 months) underwent gait analysis prior to and after corrective surgery. Eleven of the patients were hemiplegic, 11 were diplegic and two were quadriplegic, allowing 37 single limb patterns for observation. Data were obtained from a gait laboratory equipped with a VICON motion analysis system. Linear measurements included: velocity (cm/sec), cadence (steps/min), cycle time (sec), stride length (cm), toe off (% of cycle) and single stance (% of cycle). PRD was measured using a goniometer on the patient's extended leg. Excursion of the ankle joint during gait was derived from ankle motion plots. Separate 2 X 2 (surgical method by preoperative/postoperative measures) analyses of variance were conducted for: each of the linear measurements; PRD; and DAJM. Significant differences were revealed between the pre- and postoperative means for three of the six linear measures, PRD, and DAJM. Velocity increased significantly, $F(1,22) = 4.84$, $p = .04$, by nearly 12%; cycle time for each step resulted in a significant decrease, $F(1,35) = 4.06$, $p = .05$, of approximately 14%; and stride length significantly increased, $F(1,35) = 4.12$, $p = .05$, over 7% compared with normal, age matched subjects. Cadence increased approximately 9% (although not statistically significant), while toe-off and single stance parameters changed only slightly. Postoperatively the mean PRD around the ankle increased over 22° from -15.8° to +7.9°, $F(1,35) = 110.24$, $p < .001$. Results from the DAJM plots were categorized by angular acceleration (ACCEL) of the motion trace in the stance phase, and the displacement (DISPL) of the ankle in plantarflexion or dorsiflexion . ACCEL represented the relative change in ankle angle during stance and the DISPL represented the dorsiflexion and plantarflexion allowed throughout the single leg support phase. These preoperative DAJM mean values displayed a tendency toward increasing plantarflexion and equinus stance, which are both typical for cerebral palsy gait characteristics. Postoperative change for each of these two parameters was statistically significant (ACCEL: $F(1,35) = 22.74$, $p < .001$; DISPL: $F(1,35) = 105.04$, $p < .001$.) No significant differences were observed between tendinous and muscular surgical methods for any of the variables included. Despite the considerable length change in the Achilles' tendon/triceps surae muscle group following surgery, patients relearned their walking pattern to more proficient and normal characteristics. The results of the surgery significantly improved linear gait characteristics, increased PRD and produced more normal DAJM over subjects. It was concluded that pre- and postoperative gait analysis can provide greater precision in surgical planning and an objective measure of results following surgical correction of equinus deformity in children with cerebral palsy.

LONGITUDINAL STUDY OF THE EFFECT OF VISION ON POSTURE DURING THE DEVELOPMENT OF INDEPENDENT STANCE.

Heidi Sveistrup and Marjorie H. Woollacott, University of Oregon, Eugene.

In the development of balance control the infant shows behavior transitions, progressing from learning to sit, to standing with support, and finally to standing independently. In order to better understand the maturation of postural responses, and to determine whether the development of visual control of posture was a rate limiting factor in the development of independent stance the following experiments were performed. Longitudinal changes in the neuromuscular responses underlying balance control were studied in 4 infants from the age of 8 to 16 months. The latencies and organization of muscle responses of the gastrocnemius (G), tibialis anterior, hamstrings (H), quadriceps, trunk extensor (TE) and abdominal muscles were measured with surface electromyograms (EMGs) in response to the following experimental conditions: 1) horizontal platform perturbations with eyes open (somatosensory (S), visual (V) and vestibular (Vt) cues indicating sway) and eyes closed (Vt and S cues indicating sway); 2) translation of a room with walls and ceiling which moved, but with a stationary floor (V cues indicating sway). For platform translations causing forward sway under normal visual conditions, infants who were first showing the ability to pull to stand, but were unable to stand independently (9 mo) did not show a consistent postural response organization in the muscles of the leg and hip. Latencies were highly variable and the percentage of trials showing responses was very low (no G response; H: 208±104 ms; TE: 213±134 ms). After one month of dependent stance, responses became more frequent, but were still highly variable. At 11 mos, with the onset of independent stance, response organization regressed briefly, before showing consistent response patterns with low variability by 13 months of age (G:95±14; H: 114±17; TE: 175±29). When vision was occluded response organization and latencies were not different, but this could be due to the high variability of the responses under normal conditions. Under conditions of visual stimulation in isolation (moving room) postural responses could be elicited in the muscles of the leg and trunk, even in the youngest ages, when the children were only standing with support. Responses were, however, highly variable, and slow in onset latency. Thus, postural responses show a gradual drop in variability and increase in response frequency with the development of pull to stand and then independent stance abilities. Visual cues are not required for postural response activation at any age studied, but visual cues can activate postural muscle responses in isolation as early as 9 months of age. Thus vision does not appear to be a rate limiting factor in the onset of independent stance.

H.S. was funded in part by FCAR, Quebec.

CONTROL OF A GROUND LEVEL BALL AS A FUNCTION OF SKILL LEVEL AND SIGHT OF THE FOOT

Mark G. Fischman and Bill Barfield, Auburn University.

There has been a great deal of interest of late in the relationship between vision and proprioception in control of one-hand catching skills. An important question concerns whether sight of the catching hand is necessary for successful catching. The general consensus is that it is necessary because articular proprioception does not adequately specify location of the limb. In addition, vision of the hand also influences the fine temporal organization of the grasping component in simple catching, for which there is a very small margin of error. In this experiment, the interaction of vision and articular proprioception was studied in the lower limb analog of simple catching; that is, positioning the foot in a soccer control skill. Our objective was to determine whether principles of movement control that have been found to hold for the upper limb would also apply to control of the lower limb. Ten experienced male soccer players and ten novices received 40 trials in which they attempted to contact and control a soccer ball projected by a pitching machine across a distance of 10 meters. Ball speed was approximately 12.96 m/s (29 mph). In half the trials, sight of the foot was prevented by means of Kant Peek glasses worn just below the eyes. On each trial the objective was to contact the ball with the inside surface of the preferred foot and control it within a 2 m x 1.5 m grid. All trials were videotaped and errors were classified as either position errors, or control errors. 2 x 2 (Skill Level x Vision Condition) ANOVAs were conducted on the number of successful trials, position errors, and control errors. All three analyses revealed significant effects for skill level, with the experienced players performing better than the novices. The analyses on number of successful trials, and on control errors also revealed a significant effect for vision condition. This indicates that better performance resulted when subjects could see their foot. The analysis on position errors, however, failed to find a significant effect for vision condition. This means that being able to see the foot did not substantially aid in positioning it. Taken together, the data seem to indicate that vision of the foot is more important for the ball control phase of this activity than for the positioning phase. Positioning of the foot can be accomplished fairly accurately by means of articular proprioception. Finally, the lack of any interactions involving skill level indicate that both groups processed visual and proprioceptive information in a qualitatively similar fashion in this task.

CONCURRENT COGNITIVE AND MOTORIC SKILL INTERACTION

Jill Whitall, University of Wisconsin-Madison

The ability to perform cognitive and motoric tasks has been studied extensively in order to examine the brain's functional capacity to process information and its cerebral organization and structure. In this study, a dynamical systems perspective was used to predict the effect of concurrent verbal tasks with uni- and bimanual tapping. Specifically, a distinction was made between those variables which define a movement's pattern or consistency and those which specify the overall rate of a movement. Only the latter were predicted to show interference in the dual-task situation. Sixteen right-handed female adults performed the following tasks for 15 seconds under systematically re-ordered single- and dual-task conditions: unimanual and bimanual tapping; nursery rhyme recitation; speaking from a novel text and non-vocal word memorization. With the exception of memorization each task was performed as fast as possible. Unimanual and bimanual tapping were analyzed in separate 2 X 4 (hand by condition) repeated measures ANOVAS on two dependent variables: tapping rate (mean IRI) and tapping consistency (SD IRI). For tapping rate, both unimanual and bimanual analyses revealed a significant main effect for hand indicating that the right hand tapped faster across all conditions. Only the unimanual analysis revealed a significant main effect for condition. Post hoc analysis revealed that each of the three dual-task conditions were significantly slower than the single-task condition but not different from each other. No interaction effect occurred. For tapping consistency, only the bimanual analysis revealed a significant effect for hand indicating that the right hand was more consistent across all conditions. No condition or interaction effect occurred. Analysis of each cognitive task across conditions found no differences from single- to dual-task conditions. These results support the main hypothesis that movement rate and movement consistency are controlled by separate systems with the former requiring more attention. In addition, the finding that bimanual rate production did not show a deterioration in performance does not support the hypothesis that the left hemisphere has bilateral control of motor sequencing (e.g., Kimura & Archibald, 1974). These results are interpreted in a dynamical systems framework and their relationship to previous dual-task studies is explored.

SPATIAL PRECUING AND FRACTIONATED REACTION TIME

James H. Cauraugh, Dapeng Chen, and Greg Goodwin,
University of Florida.

Spatial precuing tasks have consistently shown enhanced choice reaction times for fingers on the farthest left or right response keys (Cauraugh, 1990; Cauraugh & Horrell, 1989; Reeve & Proctor 1984, 1990). One explanation for these findings has focused on the stimulus-response translation process (i.e., cognitive decision). The current study further investigated spatial precuing and the stimulus-response translation account by fractionating reaction times. If the enhanced reaction times are a product of the central decision making component, then premotor reaction time should be faster for left- and right-most finger conditions regardless of hand position. On the other hand, conflicting evidence for the stimulus-response translation account would be claimed if faster motor reaction times (peripheral component) were found for fingers on the same hand. Ten university students were randomly assigned to either an adjacent or crossed hand position. Subjects completed 170 keypressing two- or four-choice reaction time trials with their index or middle finger of either hand. Electrical activity of the flexor digitorum superficialis and the flexor digitorum profundus muscles were monitored with surface electrodes, Grass preamplifiers, and a Nicolet 4094C storage oscilloscope. An IBM microcomputer was programmed to present the warning signal, precue stimulus (hand, finger, neither, or no precue), delay interval (0, 375, 750, 1,500, or 3,000 ms), initiate a sweep of the oscilloscope, target stimulus, and record total reaction time. Three separate mixed design 2 x 5 x 4 (Hand Positions x Delay Intervals x Precues) ANOVAs with repeated measures on the delay intervals and precues were computed for each reaction time measure. Three main effects were found for both premotor and total reaction times. More importantly, the Delay x Precue x Hand Position interaction for premotor (p = .08) and motor (p = .49) reaction times were not significant. Even though these data did not provide clear support for either the spatial precuing nonmotoric or the motoric explanations the trend identified in the premotor reaction times favors the stimulus-response translation account.

THE EFFECTS OF TWO DIFFERENT BOUTS OF WEIGHT LIFTING ON SERUM TESTOSTERONE.

Glen O. Johnson, Rob Schwab, Terry J. Housh, James E. Kinder, University of Nebraska-Lincoln.

The purpose of this investigation was to determine the effect of heavy weight lifting (HWL) and light weight lifting (LWL) on concentrations of serum testosterone in six healthy males ($\bar{X}$ age = 25.2 ± 2.1 yrs) . Baseline (no exercise) testosterone concentrations were determined via an indwelling catheter in the median cubital vein for one hour at 10 minute intervals, followed by four minute samples for 12 minutes and then 10 minute intervals for another hour. Blood samples were obtained at similar intervals prior to, during and following HWL and LWL. The HWL and LWL exercise sessions were performed in a random order in successive weeks on the same day and at the same time of day as the baseline measurements. The HWL sessions consisted of four sets of six squats at 90-95% of a 6RM while the LWL sessions involved four sets of 10 squats at 60 percent of the load used for the HWL sessions. Thus, total work for the two sessions was equated. Trend analysis indicated that testosterone concentrations increased signficantly ($p < 0.05$) from pre-exercise values during HWL and LWL by 19.1 and 11.8 percent, respectively. Following HWL, there was an immediate decline in testosterone to pre-exercise levels. For the LWL session, testosterone decreased to baseline levels immediately following exercise and steadily declined to 22.6 percent below pre-exercise levels at one hour post-exercise ($P < 0.05$). The results of this investigation indicated that HWL and LWL caused increases in testosterone that were greater than those associated with normal baseline fluctuations. In addition, the post-exercise trends for the HWL and LWL sessions demonstrated significantly different patterns.

MUSCLE ENZYME EFFLUX IN RESPONSE TO REPEATED GAMES OF BASEBALL PITCHING.

Jeffrey A. Potteiger, Daniel L. Blessing & G. Dennis Wilson, Auburn University.

The appearance in the blood of intramuscular enzymes is considered indicative of skeletal muscle fiber damage. With increased severity of muscle fiber damage there is a decrease in force production. The purpose of this experiment was to examine the serum concentrations of creatine kinase (CK) and lactate dehydrogenase (LDH), along with muscle soreness (MS) and pitch velocity (PV), in response to repeated games of baseball pitching. Ten college age males, with pitching experience, participated in the study. Following an 18 d training period subjects pitched three simulated games. Game A (G-A) and Game B (G-B) were separated by 4 d rest, while G-B and Game C (G-C) were separated by 2 d rest. CK, LDH and MS were evaluated at the following times: pre and immediately post-exercise, and 6, 24, 48, 72 h post-exercise. Performance was evaluated by measuring PV during the games. A repeated measures ANOVA was used to examine the data. Contrast comparison tests were employed to determine where the differences occurred. CK exhibited a significant quadratic effect ($p \leq 0.01$) after each game, with peak values increasing as much as 139% over pre-exercise levels. CK post-exercise values were not different between games A, B and C. LDH displayed a significant quadratic effect ($p \leq 0.01$) after each game, although there was a reduction over games ($p \leq 0.05$). MS was greatest immediately post-exercise ($p \leq 0.01$), and then decreased progressively to pre-exercise values. PV was not different during or between games. Results indicate that muscle damage, as evidenced by CK and LDH release, is occurring in the body. However, the muscle damage was not severe enough to alter pitching performance as PV was not affected.

EVENT ORDER IN THE BIATHLON DOES NOT HAVE AN EFFECT ON METABOLIC RESPONSE

J. Ledbetter and A. Jackson, Univ. of North Texas

The purpose of this study was to examine the effects of event order on a cycling(C)/running(R) or R/C biathlon. Eight experienced male biathletes/triathletes with a mean age of 24.9±4.6 yr, weight of 71.2±8.1 kg and height of 178.6±7.6 cm formed the sample of the study. Peak O_2 consumption was measured during stationary C and treadmill R which resulted in different ($p<.01$) mean values of 58.8±8.7 and 65.3±6.7 ml/kg/min. They performed a 40 min treadmill R and 60 min of C at 70% of peak O_2 consumption and at the end workload was increased to elicit exhaustion and maximal values. Heart rate (HR), ventilation (V_e) and O_2 consumption were measured an recorded at 10, 30, 40 min (60 min C) and at exhaustion. Finally, subjects did a C (60 min)/R (40 min) and R (40 min)/C (60 min) biathlon at 70% of maximum capacity which ended with tests to exhaustion. All tests were done on different days in a counterbalanced order. Repeated measures ANOVA revealed no significant interactions between mode (R or C) and biathlon order of R/C or C/R for submaximal values of VO_2, V_e and HR and also for peak VO_2 at exhaustion. HR was elevated ($p<.01$) in the R/C and C/R compared to independent submaximal tests which was anticipated due to cardiovascular drift. These results indicated submaximal metabolic response and peak VO_2 in the biathletes/triathletes were not affected by event order.

EXERCISE EFFECTS ON LDL CLEARANCE

R. C. Westerfield, T. J. Pujol, J. L. Mego, The University of Alabama.

Previous research has indicated a relationship between atherosclerosis and the levels of circulating LDLs. The clearance of LDLs from plasma has been shown to be dependent upon the number and activity of LDL-receptors. Several factors may determine the total number and activity levels of LDL-receptors. Genetic and long-term dietary factors have been identified as exerting influence on the number of LDL-receptors. Previous research has shown exercise reduces the plasma levels of LDL, but the exact physiological mechanism has not been elucidated. The purpose of this investigation was to determine the effect(s) of a regular exercise regimen on ^{125}I-LDL clearance. Seventeen NZW rabbits were randomly assigned to exercise (N=9) or sedentary (N=8) groups and fed standard chow ad libitum. Exercise rabbits received daily exercise on a small animal treadmill for 52 weeks. The exercise regimen was progressive initially beginning at 17 m/min at 0% grade for 10 min. and increased to 30 m/min at 2% grade for 15 min. twice daily. Rabbit LDL was isolated by ultracentrifugation from non-experimental animals. The LDL was labeled by the iodine monochloride method. Twelve hours prior to testing an indwelling catheter was placed in the medial artery of the ear. 0.25 mg ^{125}I-LDL (6.6 x 10^7 cpm/micro.g.protein) was injected into each fasting (12 hrs) subject via the indwelling catheter. Blood samples were drawn 1, 2, 3, 4, 5, 12, and 24 hours post injection. LDL clearance was determined by scintillation counting of ^{125}I. ANOVA indicated no significant differences in serum ^{125}I-LDL levels between groups. There were no significant differences between the ^{125}I-LDL clearance-time curves of the exercise and sedentary groups. This study indicated ^{125}I-LDL clearance was consistent among subjects and easily reproduced. Failure to detect difference in ^{125}I-LDL clearance between groups may reflect a subtle physiological response resulting from a low cellular accumulation of cholesterol.

COENZYME Q10'S EFFECT ON MAXIMAL EXERCISE CAPACITY.

Joanne Roberts, Texas A & M University.

Coenzyme Q10 (Q10) is a lipid component of the mitochondrial respiratory chain, where its role as electron carrier in the process of oxidative phosphorylation is well acknowledge. Its presence is therefore of fundamental importance in the aerobic adenosine triphosphate synthesis mechanism. Health food stores are marketing the food supplement Q10 as the "Miracle Nutrient" that can increase exercise performance. Several studies have found that supplementation with Q10 improves oxygen consumption (VO2max), maximal workload (WLmax), and total exercise time (TET) in cardiac patients. Even though there has been a plethora of research on the effects of Q10 on performance in cardiac patients, there is a dearth of information on Q10's possible ergogenic effect in asymptomatic individuals. The purpose of this investigation was to determine the effect of supplementation with Q10 utilizing 24 asymptomatic college age males and females with blood Q10 levels ≤ 0.83 ug/ml. Subjects were administered 100 mg of Q10 or a placebo in a double blind manner for 28 days. Subjects were included in the analyses only if they demonstrated a 95% compliance to the ingestion of the Q10 ($n=17$). Initial and final measurements were taken on blood Q10 levels, VO2max, WLmax, and TET. Correlations were performed on the initial test data to determine the relationships among the dependent variables. Blood Q10 level was found to exhibit orthogonality and was analyzed independently using ANOVA. VO2max, WLmax, and TET were found to exhibit nonorthogonality and were analyzed using MANOVA. Blood Q10 level increased in the Q10 group from 0.73 ug/ml to 1.49 ug/ml ($p \le .05$) and decreased slightly in the placebo group from 0.65 ug/ml to 0.57 ug/ml. There was no difference in VO2max, WLmax, and TET over time or between groups. Based on the results of this investigation, it was concluded that supplementation with 100 mg/day of Q10 for 4 weeks increases blood Q10 levels yet does not improve VO2max, WLmax and TET in young sedentary individuals.

HEART SIZE AND WALL THICKNESS IN WOMEN BASKETBALL ATHLETES AFTER DETRAINING

Stephen F. Crouse, James J. Rohack, and Dennis J. Jacobsen, Applied Exercise Science Laboratory and College of Medicine, Texas A&M University, College Station, TX.

The sports literature is replete with echocardiographic (ECHO) studies of male athletes, yet a paucity of similar information is available for women. Furthermore, the effect of detraining on heart dimensions has rarely been studied. Therefore, the purpose of the present study was to determine the effects of off-season deconditioning on cardiac dimensions and wall thicknesses in women basketball (BB) athletes. M-mode, two-dimensional and Doppler flow ECHO studies were performed twice on NCAA Division I BB athletes (n=10), once at the conclusion of their competitive season (CS), and again at the beginning of the subsequent training season after offseason deconditioning (DC). Images of the heart were obtained using standard transducer positions resulting in cross-sectional planes with the subject in the resting, left lateral decubitus position. Left ventricular (LV) mass (LVM) and LV end-diastolic (LVEDV) and end-systolic (LVESV) volumes were subsequently calculated. Maximum oxygen uptake ($\dot{V}O_2$max) was measured with an automated system on a motorized treadmill. The data were analyzed using a one-way MANOVA with repeated measures followed with univariate ANOVA techniques where appropriate. The results are presented in the table (* indicates significant difference, $p<0.05$).

Variable	CS ± SEM	DC ± SEM
Height (cm)	176.8 ± 1.78	177.8 ± 2.36
Weight (kg)	72.4 ± 2.31	74.1 ± 2.65
$\dot{V}O_2$max ($ml \cdot kg^{-1} \cdot min^{-1}$)	43.6 ± 1.95	43.8 ± 1.94
LV internal diameter-dias (cm)	4.99 ± 0.17	4.85 ± 0.10
LV internal diameter-sys (cm)	3.14 ± 0.12*	2.83 ± 0.08
Left atrial dimension (cm)	3.20 ± 0.09	3.46 ± 0.10
Aortic root diameter (cm)	2.60 ± 0.11	2.79 ± 0.09
LV end-diastolic volume (ml)	119.38 ± 9.27	111.73 ± 5.03
LV end-systolic volume (ml)	29.13 ± 2.56	23.52 ± 1.28
LV septal thickness (cm)	1.13 ± 0.03*	1.05 ± 0.02
LV posterior wall thickness (cm)	1.02 ± 0.01*	0.97 ± 0.02
Aortic blood velocity ($m \cdot sec^{-1}$)	1.25 ± 0.07*	1.07 ± 0.06
LV mass (g)	236.85 ± 12.70*	205.81 ± 8.72

Thus, offseason deconditioning caused moderate atrophy of heart tissue in these athletes, yet $\dot{V}O_2$max was maintained. It is likely that the increased wall thicknesses noted at period CS result from anaerobic power training during the competitive season.

POTASSIUM CONTENT OF THE FAT-FREE BODY: EFFECTS OF GENDER, PHYSICAL ACTIVITY, MATURATION, AND AGE. M.H. Slaughter, University of Illinois; C.B. Christ, University of Illinois; R.A. Boileau, University of Illinois; and R.J. Stillman, University of Illinois, Urbana, Illinois.

Variability associated with the effects of gender, physical activity level, maturation level (ML), and age on the potassium content of the fat-free body (K/FFB) was investigated in 114 males and 91 females, aged 8 to 17 years. Measures of body density (hydrostatic weighing), bone mineral content (single photon absorptiometry), total body water (modified deuterium dilution), and whole body potassium (40K spectroscopy) were obtained. FFB was calculated using a multicomponent model that accounted for the variability in FFB mineral and water content. Subjects were classified by ML as prepubescent, pubescent, and postpubescent (Tanner stages). Subjects also were classified by physical activity group as high (age group swimmers) and low (no organized training). Least squares multiple regression analysis using weighted orthogonal contrasts to account for sample size differences revealed a significant ($p < .01$) gender x ML (linear) interaction, and a nearly significant ($p > .07$) gender x activity x ML (quadratic) interaction. The within gender analysis revealed a significant ($p < .01$) ML (quadratic) effect for the males. In contrast, no significant ($p > .05$) main effects or interactions were observed within the female sample. The following K/FFB means were observed in the male and female, high and low physical activity samples:

Group	N	Prepub.	N	Pub.	N	Postpub.
Male High Act.	12	2.49	25	2.48	5	2.60
Male Low Act.	25	2.60	33	2.46	14	2.59
Female High Act.	14	2.50	23	2.57	7	2.43
Female Low Act.	12	2.43	21	2.47	14	2.53

These results indicate that males significantly increase their K/FFB across ML; however, the pattern and magnitude of increase is dependent upon the physical activity group considered. Therefore, consideration of gender, physical activity and ML is essential in estimating FFB from total body potassium measurements.

This project was supported by NIH Grant No. AG08153

AGE RELATED DIFFERENCES IN MID-SHAFT AND DISTAL RADIAL BONE MINERAL CONTENT AND BONE MINERAL INDEX IN WOMEN.

C.B. Christ, University of Illinois; J.R. Johnson, Longwood College; M.H. Slaughter, R.A. Boileau, R.J. Stillman, and B.H. Massey, University of Illinois, Urbana, IL.

The onset and rate of decline in cortical versus trabecular bone mineral is not well established. Previous work has shown that the mid-shaft (MS) site of the radius is predominantly comprised of cortical bone, while the distal radius (DR, 5 mm. distance between ulna and radius) contains a larger proportion of trabecular bone. The purpose of this study was to determine whether the onset and rate of decline across age in bone mineral content (BMC) and bone mineral index (BMI, bone mineral content/bone width) differed between the MS and DR sites. The subjects (N=137) ranged in age from 25 to 74 years, and were categorized by age into ten 5-year groups. Measures of right (dominant arm) radial BMC and BMI were obtained utilizing single photon absorptiometry. Physical activity (PA) and menstrual status (MST) data were obtained by questionnaire, and body composition was estimated from anthropometric measures. Results from two (BMC, BMI), 10 (age group) x 2 (site) repeated measures analyses of variance revealed significant ($p < .05$) age group and site differences for BMC and BMI; however, the age group x site interaction for BMC and BMI failed to reach statistical significance. The non-significant interactions suggest that the pattern of decline in BMC and BMI across age at the two sites is similar. This finding was apparent when contrasting the percent decline in BMC at the MS and DR sites between the youngest and oldest age groups. A 17.1% decline was noted at the MS site while an 18.1% decline was observed at the DR site. Greater age group differences between the sites were noted for BMI. A 16.4% decline in BMI was detected at the MS site between the youngest and oldest age groups while a 21.6% drop off was observed at the DR site. Duncan's post-hoc comparisons revealed that the 25 to 59 year olds had significantly higher BMC at the MS site than the 60 to 74 year olds. The BMI at the MS site also declined abruptly, as the 25 to 59 year olds had significantly greater BMI than the 60-74 year olds. In contrast, the decline in BMC and BMI at the DR site occured earlier in the age range when compared to the MS site. The significant age group and site effects were upheld when the influence of PA, MST, and percent fat on BMC and BMI was statistically controlled. These results suggest that although the age x site interaction failed to reach statistical significance, the decline in BMC and BMI across age occurs earlier, and is more marked, at the DR when compared to the MS site; hence, the integrity of trabecular bone may be compromised sooner and more markedly than cortical bone.

EFFECT OF MUSIC ON HEART RATE, PRECEIVED EXERTION, AND BLOOD LACTATE DURING TREADMILL RUNNING.

Leon Szmedra, David Bacharach*, Serge Von Duvillard**, Jin Meng, Mark Kellish, John Fatouros, and Phil Buckenmeyer, Syracuse University, *St. Cloud State University, **University of Lowell.

Music has been associated with a meditative state in that senses seem to be modified enabling individuals to separate conscious thought from feeling, thereby eliminating sensations of pain from their surroundings. With the popularity of using headphone music during exercise, it would be useful to examine how music affects a person's physiological and/or psychological parameters while running. It was hypothesized that music may enable an individual to dissociate cardiorespiratory and peripheral cues of stress such that their perception of a work bout would be less. The subjects (N=10, male, mean age=26.2±7.8 yr) Mean maxVO_2=64.4±9.5 ml/kg/min^{-1} was determined by open circuit spirometry on a motor driven treadmill. Two prescribed work bouts were performed 72 hr apart consisting of treadmill running for 15 min at 70% maxVO_2. Subjects listened to music, "Hooked on Classics 3, Royal Philharmonic Orchestra" during one of the two experimental trials. Presentation of the music trial was counterbalanced for order effect. Each trial consisted of a supine rest, an exercise period, and a three minute active recovery period (35%maxVO_2). A resting venous blood sample was drawn when respiratory exchange ratio (RER) was <.85 and a post exercise blood sample was drawn following the active recovery period. Heart rate (HR), perceived exertion (RPE), and VO_2 were recorded during the last five minutes of the exercise period. Mean resting HR, resting blood lactate (LA) and mean exercising VO_2 values were not different between the two trials. However, mean exercising HR and RPE as well as post exercise LA values (±S.E.) were all significantly different between trials. Mean HR with music was reduced from 152.9±5.28 bpm to 145.9±4.68 bpm [t(9)=1.91, p<.04]. Mean RPE was also lower during the music trial going from RPE=14.4±.43 to RPE=12.9±.41 [t(9)=3.14, p<.006]. Post exercise LA values were 1.44±.18 mmol during the music trial and 2.51±.15 mmol while exercising without music [t(9)=8.32, p,.001]. The increase in blood LA along with the modest yet significant seven beat per minute increase in HR is suggestive of a greater metabolic demand; however, VO_2 was not different. Perhaps the music trial allowed the subjects to become more efficient by reducing muscle tension (peripherally and/or centrally mediated) such that blood flow and LA clearance in the working muscle was superior. These data certainly would support the need for further investigation as to how music influences physiological and psychological parameters during exercise.

EFFECTS OF RETRO RUNNING ON FLEXIBILITY AND HAMSTRING/QUADRACEP STRENGTH RATIO.

David W. Bacharach, St. Cloud State University and Susan Korchak, Syracuse University.

A common problem in chronic runners is poor hamstring and low back flexibility. This study investigated the effect retro running (RR) has on hamstring low back flexibility and hamstring/quadracep (H/Q) strength ratios in 20 male runners. Subjects were randomly assigned to the forward running (FR) or the RR group. Each subject completed the following: a sit-and-reach test; a leg extension/flexion test using a Cybex II dynomometer at 60 degrees per second; and a maximal treadmill test using open-circuit spirometry to determine a 70% maxVO_2 training intensity. The RR group also completed a retro treadmill test while measuring VO_2 to identify the training intensity eliciting 70% maxVO_2 of FR. Subjects exercised for eight weeks, three times per week, for 30 minutes per day on a 200M indoor running track. The FR group ran forward and the RR group alternated backward laps with forward laps. Target heart rate zones were given to each subject that matched training at 70% maxVO_2. Scores for flexibility and H/Q ratios showed no changes from pre to post test for the FR group, while the RR group improved flexibility as measured by sit-and-reach from -4.4 ± 3.0 cm to 9.8 ± 6.1 cm ($t = 7.75$, $p < .01$) after the eight weeks of training. This suggests RR can improve flexibility without affecting H/Q ratios.

DOES CROSS TRAINING IMPACT PREDICTION OF TRIATHLON PERFORMANCE? Mary Whitman, The Miriam Hospital; Bo Fernhall, Thomas Manfredi, The University of Rhode Island, Kingston.

It has been recently suggested that training volume and the possible effect of cross training are important contributors to triathlon race performance. Therefore, the purpose of this study was to investigate the ability of training volume and a combination of laboratory values to predict triathlon performance. 20 male triathletes ($\bar{x}$ age=26.65±4.6;$\bar{x}$ wt.=74.3kg±6;$\bar{x}$ ht.=178.7cm±6.4) participated in the study and completed a 0.8 km swim, 27.4 km bike and 8.1 km run. Overall race time was 94.3 min., with swim time 14.98 min., bike time 49.6 min., and run time 26.7 min. Each subject completed 2 maximal oxygen consumption ($\dot{V}O2$ max)tests before the race; one each on the treadmill(TM) and cycle ergometer(CE). Each test was separated by 48 hours and the order of the tests was randomized. Ventilatory threshold (VT) was determined by 2 independent investigators for each test (interinvestigator reliability r=.84). The running and cycling VO2 max and VT were used to predict the running, cycling and combined run and cycle portions of the triathlon. Training volume of running, cycling and swimming was used to predict overall triathlon race time. TM $\dot{V}O2$ max (60.1±4.2ml·kg min) was significantly higher but not significantly different from CE $\dot{V}O2$ max (57.5±5.2ml $kg^{-1}\cdot min^{-1}$). Neither TM VO2 max nor speed at VT significantly predicted run performance. Likewise, neither CE VO2 max nor power at VT significantly predicted cycle performance (r<.40 for all variables). However, the combination of CE VO2 max and running speed at VT significantly predicted the combined run and cycle performance (R=.822,p<.001). The amount of miles run and cycled and yards swum during training also significantly predicted total race performance (r= -.80, r= -.78,r= -.46, respectively). However, none of the individual training volumes significantly predicted its own race portion (r= -.25,r= -.28,r= -.06, respectively). Because the combination of running and cycling laboratory values better predicted the combined run and cycle performance than the individual run or cycle times, coupled with better prediction of overall race time than specific race portions by individual training volumes suggest that cross training has an important impact on triathlon performance.

METABOLIC ANALYSIS OF ISOTONIC EXERCISE PERFORMED AT TWO RESISTANCES AND TWO CADENCES. R. D. Liverman, Illinois State University and W. Hurst, Modesto, California.

Strength training programs, especially those using Nautilus equipment, have become quite popular in recent years, even for those whose main purpose for exercise is to lose weight. While it has been shown that using a traditional strength protocol of high resistance, low repetitions and slow cadence is relatively low in kilocalorie cost, the effect on energy cost of modifying the training protocol is unknown. The purpose of this study was to compare the metabolic cost of isotonic exercise performed at two resistances and two cadences while keeping constant the total work performed. The exercises consisted of the leg extension and leg press done consecutively using a Nautilus machine doing 8 and 16 repetitions maximum (RM) and with the repetitions being 4 and 7 seconds in time. Nineteen males were tested under the following conditions on three separate days: 8RM with a 2-sec. concentric contraction, a one second pause and a 4-sec. eccentric contraction (8RM, 2-4); 16 RM with a 2-4 cadence (16RM, 2-4); and 16 RM with a 1-2 cadence (16RM, 1-2). The energy expenditure in kilocalories per minute per kilogram of body weight (Kcal/min/kg) was determined for each condition. The data were analyzed by an ANOVA for repeated measures using the Scheffé method to locate specific differences when a significant F ($p<.05$) was obtained. The statistical analyses revealed that the energy cost of condition 8RM, 2-4 (.095 Kcal/min/kg) was significantly larger than both condition 16 RM, 2-4 (0.054 Kcal/min/kg) and condition 16RM, 1-2 (0.085 Kcal/min/kg) and condition 16RM, 1-2 was significantly greater than condition 16RM, 2-4. Because of the outcome, a second group of subjects ($n=15$) were tested under the following conditions: 8RM, 2-4; and 8RM, 1-2. An ANOVA for repeated measures showed that the energy cost of condition 8RM, 1-2 (0.152 Kcal/min/kg) was significantly greater ($p<.05$) than the condition 8RM, 2-4 (0.097 Kcal/min/kg). Using an independent sample ANOVA revealed no significant difference ($p<.05$) between 8RM, 2-4 ($n=19$) and 8RM, 2-4 ($n=15$). The results show that the highest energy cost (0.152 Kcal/min/kg) was for 8RM's with a 1-2 cadence and the lowest cost (0.054 Kcal/min) was for 16RM with a 2-4 cadence. To utilize the highest number of calories in a given time, it would be more advantageous to do isotonic exercises with a high resistance (8RM) and fast cadence (1-2) rather than low resistance (16RM) and slow (2-4) or fast (1-2) cadence.

ENERGY COST DURING THREE DIFFERENT AEROBIC DANCE ROUTINES

Brenda Reeves and Lynn Darby, Bowling Green State University

Current research comparing the energy expenditure of various forms of aerobic dance have reported conflicting results as to whether low-impact aerobics produce metabolic requirements similar to those of high-impact (traditional) aerobics. The purpose of this study was to examine the energy cost, oxygen consumption and HR response of college-age females to three exercise bouts, each implementing a different mode of aerobic dance: high-impact (HIM), low-impact (LIM) and low-impact with 1 lb. handheld weights (LIM/W). Seven females, ages 18-21, volunteered to perform three 15-minute aerobic dance routines presented in a videotaped format with a two-week familiarization period between modes. HIM routines consisted of 10 traditional aerobic dance maneuvers choreographed to music of 150 bpm. LIM and LIM/W routines were matched for music and movements; however, both routines employed arm movements at heart-level or higher. During each dance exercise bout, VO2ml/kg-m, HR and RER were recorded for each one-minute interval using a metabolic cart and heart rate monitor. VO2 max was assessed during pre- and post-tests. Results were:

	HR*	VO2ml/kg-m*	%VO2max*	Kcal/m*
HIM	178±3.94	35.08±1.20	77±2.7	10.06±.66
LIM	177±3.02	31.55±1.71	72±2.7	9.43±.61
LIM/W	175±4.94	31.67±1.35	70±2.3	9.14±.51

* $\bar{x}$ ± S.D. for each 15-min routine.

One-way repeated measures ANOVAs (p<.05) were calculated to evaluate differences in mean VO2ml/kg-m, HR and Kcal among the three different aerobic dance routines as well as to assess differences in pre- and post-test VO2 max. Statistical analyses revealed no physiological training response within subjects as well as no significant differences between the metabolic requirements of the three modes of aerobic dance. Regression analyses identified no significant differences between HR and VO2 (over the 15-min duration) among the three routines. These data indicate that all three currently employed modes of aerobic dance produce similar metabolic requirements.

Funded in part by the BGSU Graduate College.

ESTIMATION OF SUBMAXIMAL TRAINING INTENSITY FROM MEASURED MAXIMAL OXYGEN UPTAKE IN SEDENTARY MIDDLE-AGED MALES: IS IT VALID?

Robert C. Lowe, Dennis J. Jacobsen, Stephen F. Crouse. Applied Exercise Science Laboratory, Texas A&M University, College Station, TX 77843

Accurate exercise intensities as part of exercise prescription are paramount to the safety and effectiveness of exercise programs, rehabilitation and research. Measured maximum oxygen uptake ($\dot{V}O_2$ max) is widely used to assess the aerobic component of fitness prior to exercise prescription. Oxygen consumption has been shown to be linearly related to heart rate over a wide range of workloads. The prediction of submaximal exercise intensities based on the relationship between oxygen consumption and workload should therefore accurately estimate submaximal oxygen consumption. Hence, the purpose of this investigation was to compare measured oxygen consumption ($\dot{V}O_2$) during submaximal (SUB) bicycle ergometry to the $\dot{V}O_2$ which was predicted (PRED) from $\dot{V}O_2$ max following a progressive maximal bicycle test (MAX). Previously untrained middle-aged males ($\overline{X}_{age}=46\pm9$yr; $\overline{X}_{vo2}=31\pm6.7ml\cdot$kg$^{-1}\cdot$min^{-1}) were randomly assigned to either low (LO) intensity (50% $\dot{V}O_2$ max, n=19) or high (HI) intensity (80% $\dot{V}O_2$ max, n=20) exercise bouts. All subjects completed their respective submaximal exercise bout (350 kcal) within one week of the MAX test. $\dot{V}O_2$ (L$\cdot$min^{-1}) was measured via open spirometry techniques. During the SUB session, $\dot{V}O_2$ was averaged during 5 minute intervals. The data were analyzed using a one-way ANOVA and Duncan mean separation procedures where appropriate. The results are presented as Means(±SD) in the following table:

GROUP	PRED	SUB	MAX
HI	2.037(±.405)	2.575^a(±.447)	2.540^a(±.505)
LO	1.263(±.241)	1.429^b(±.289)	2.521^c(±.481)

a=different from PRED ($p<0.05$); b=different from PRED and MAX ($p<0.05$) ; c=different from SUB and PRED ($p<0.05$).

These results suggest that exercise prescriptions based upon initial MAX testing may markedly underestimate actual $\dot{V}O_2$ during subsequent SUB exercise sessions in previously sedentary males. These findings have significant implications for both clinicians and researchers concerned with providing safe and effective exercise prescriptions.

EFFECTS OF WALKING DURATION ON EXCESS POST EXERCISE OXYGEN CONSUMPTION.

Linda F. Chitwood, Robert J. Moffatt, Brenda G. Marques, and Dae T. Lee, Exercise Physiology Lab., Florida State University, Tallahassee, FL 32306

To examine the effects of walking duration on excess post exercise oxygen consumption (EPOC) and resting metabolic rate (RMR) seven overfat sedentary females completed treadmill walking sessions of 30, 45, 60, 75 and 90 min. Each of the five walking sessions followed a 12 hour overnight fast and consisted of one hour pre-exercise rest (PRE-EX), one of five randomly assigned exercise durations, and one hour post-exercise rest (POST-EX). Exercise heart rate averaged 58 ± 3% (mean ± S.D.) of maximal heart rate reserve for all sessions. Oxygen consumption (VO_2) was continuously monitored by open circuit spirometry during PRE-EX and POST-EX rest and during the final 10 min of exercise. A repeated measures ANOVA was utilized for the analysis of data with Newman-Keuls' post-hoc employed to locate significant differences between means. Duration (min) of EPOC was significantly ($p < .05$) affected by walking duration as VO_2 remained elevated above rest following 30 (29.29 ± 14.98 min), 45 (45.71 ± 17.60 min), 60 (48.21 ± 17.48 min), 75 (51.07 ± 15.40 min) and 90 (52.85 ± 11.50 min) min exercise bouts. As such, duration of EPOC was significantly less following the 30 min walk than following all other exercise sessions. Differences between 45, 60, 75 and 90 min were not significant. The magnitude of EPOC (net oxygen consumed) following the 45 min walk (2.22 ± 0.88 L) was significantly less than 90 min (3.33 ± 1.44 L) while 30 min (1.54 ± .71 L) was significantly less than all walking durations. Mean POST-EX RMR (2.93 ± 0.05 ml O_2/kg/min) following the five walking bouts was significantly higher than mean PRE-EX RMR (2.70 ± 0.04 ml O_2/kg/min). One hour following each walking bout, POST-EX RMRs were elevated 5.5% (30 min), 8.9% (45 min), 10.7% (60 min), 9.6% (75 min) and 11.0% (90 min) above PRE-EX RMR. These results suggest that walking durations of 30 to 90 min serve to elevate POST-EX RMR in sedentary overfat females. Both the magnitude and duration of EPOC during the first hour of recovery are increased as walking duration is extended.

EFFECTS OF EXERCISE AND DIET ON BLOOD LIPIDS IN MIDDLE-AGED ACTIVE WOMEN EITHER TAKING OR NOT TAKING HORMONE REPLACEMENT THERAPY.

Edwyna Pace Testerman, Stephen R. Hotard, University of Southwestern Louisiana; Ronald J. Byrd, Louisiana State University/Shreveport; Denis Tallini, Our Lady of Lourdes Hospital; Paula S. Williams, University of Southwestern Louisiana.

The purpose of this study was to determine the effects of exercise and diet on blood lipids in healthy, active, middle-aged women either taking or not taking hormone replacement therapy. All subjects had normal prestudy levels of plasma total cholestrol (TC), triglyceride (Tg), high density lipoprotein (HDL-C) and low density lipoprotein (LDL-C). Subjects were nonsmokers, free from chronic cardiovascular diseases, taking no medication, nondiabetic, walking 10 miles or more weekly, and instructed not to drink alcohol beverages during the 14 wks. Following a 12-hour fast, levels of TC, Tg, HDL-C, LDL-C, and TC/HDL-C ratio were measured before and after taking a 14-wk training program in 17 women ($\bar{x}$ age =51) taking hormone replacement therapy (HRT), 25 women ($\bar{x}$ age =50) not taking hormone replacement therapy (NHT), and 12 nonexercising women as controls ($\bar{x}$ age =49). The dietary regimen consisted of 1200 kcal a day, while the training program was 3 days a wk (plus an additional weekend day on subjects' own) of 45 min of walking/jogging at 70-75% individual age-adjusted maximal heart rate (220-age). Pre and post tests included blood analysis, sum of triceps, suprailium and thigh skinfolds and body weight. Data were analyzed with ANCOVA, using the pre scores as the covariate and the post scores as the dependent variables. Both HRT and NHT groups showed a significant increase in HDL-C with the HRT subjects showing a greater increase of 17% to the NHT increase of 10%. There was no significant change in the nonexercising controls. Triglyceride, TC, LDL-C, and TC/HDL-C ratio did not change significantly for any of the groups. Changes in body weight were significantly greater for the NHT group (-5.5%) than the HRT (-3.0%); both groups showed a significant difference from the controls. The HRT and NHT groups significantly decreased the sum of three skinfolds 22% and 28% respectively with no difference in the control group. It was concluded that HRT substantially increased HDL-C more for these women than women not taking hormone replacement therapy.

BEST COPY AVAILABLE

REPLICABILITY OF REFLOTRON® SERUM CHOLESTEROL MEASUREMENTS

Leonard A. Kaminsky and Mitchell H. Whaley.
Ball State University, Human Perfromance Laboratory.

This study investigated the recommendation (J Cardiopulm Rehab 10:416,1990) that initial cholesterol measurements made with a Reflotron analyzer be performed in duplicate. Two cholesterol measurements were made with a Reflotron analyzer on 181 serum samples. Serum cholesterol samples ranged in value from 100 to 318 mg/dL. Standard quality control procedures were used throughout the study. The percent difference between the duplicate samples was determined by dividing the difference between the two measurements of each sample by the mean of the two samples (x100). The mean absolute and relative differences between the two measures was 4.6 ± 3.6 mg/dL or 2.6 ± 1.7%, with a range from 0 to 20 mg/dL or 0 to 8.9%. The need for duplicate analyses can be interpreted in two ways: 1) did a duplicate analysis change the National Cholesterol Education Program (NCEP) classification of the sample; and 2) how many duplicate samples differed by more than 5% of each other suggesting a benefit of averaging the two samples to increase the stability of the measurement for long term cholesterol monitoring? When assessed by the first method, only 4 of the 181 samples (2.2%) would have had a different NCEP classification if only one sample was analyzed. Using the second method, 15 of the 181 samples (8.3%) had differences >5% between the duplicate measurements. These data support previous findings which demonstrate that, on an overall basis, the reliability of the Reflotron analyzer meets the current "acceptable" level for precision of cholesterol measurements established by the Laboratory Standardization Panel of the NCEP. However, since 8% of individual duplicate samples deviated by more than 5% from the mean of the two samples, these results confirm the need to perform initial cholesterol measurements in duplicate. Although this recommendation was established using the Reflotron analyzer, it may well apply to most methods for cholesterol measurement. Performing the initial measurements in duplicate would reduce the amount of analytical variability observed in cholesterol measurements and thus would aid in establishing a more representative baseline value for monitoring an individuals' cholesterol concentration over a long period of time.

Support for this project was obtained, in part, from Boehringer Mannheim Diagnostics, Indianapolis, Indiana.

CIRCADIAN RHYTHMS AND PREDICTED MAXIMUM OXYGEN CONSUMPTION AT THREE SELECTED TIMES OF DAY.

J.E. Hornak and P. Ewbank, Central Michigan University

The purpose of this study was to determine whether circadian rhythms affect maximum oxygen consumption values predicted from submaximal exercise heart rates at three different times of day. Eight college-age males exercised according to the Astrand and Rodahl (1977) protocol on a friction-loaded Monark bicycle ergometer. Submaximal exercise heart rates from the final minute of 150 watt exercise were recorded at 0600, 1200, and 1800 hours and applied to the Astrand (1960) nomogram. To minimize training effect, subjects performed one test per week. Submaximal exercise heart rates and $\dot{V}O_2$ max values were then examined for circadian rhythms.

Hour	Mean Heart Rate	SD	Mean Predicted $\dot{V}O_2$ max		SD
0600	138.88	11.59	3.68		.53
1200	139.75	15.43	3.69		.68
1800	141.13	13.78	3.60		.61
	F=.24810		F=.77323		

Test	Mean Heart Rate	SD	Mean Predicted $\dot{V}O_2$ max		SD
1.	143.13	15.35	3.53		.56
2.	140.50	13.13	3.61	**	.58
3.	136.13	11.36	3.83		.56
	F=3.49		F=4.352*		

**Significant difference at .05 level

*3.74 needed for significance at .05 level

Submaximal heart rates and $\dot{V}O_2$ max were analyzed using ANOVA, with the level of significance set at .05. Results indicated no circadian influence upon submaximal exercise heart rates or predicted $\dot{V}O_2$ max. Seven of the eight subjects recorded highest heart rates during initial testing. This suggested that factors associated with order of testing, such as the learning effect, influenced data. Data were analyzed according to order of test completion. Results indicated that the learning effect significantly influenced predicted $\dot{V}O_2$ max but not submaximal exercise heart rates. Conclusions: These findings show circadian rhythms do not significantly affect submaximal exercise heart rates and maximum oxygen consumption valued predicted from the Astrand (1960) nomogram. Learning effect does not significantly affect submaximal exercise heart rates but does significantly affect maximum oxygen consumption values predicted from the Astrand (1960) nomogram.

FLUID BALANCE IN MEN AND WOMEN DURING A 40 KM RUN IN THE HEAT

M.L. Millard-Stafford, P.B. Sparling, and L.B. Rosskopf. Health and Performance Sciences, Georgia Institute of Technology, Atlanta, GA 30332-0110.

The American College of Sports Medicine (1987) recommends a fluid intake of 100-200 ml every 2-3 km during prolonged running in the heat. However, the optimal dosage required to maintain fluid balance may depend on several factors such as state of training, severity of heat stress, and duration of running. Therefore, the purpose of this study was to examine fluid requirements in ten highly-trained, heat-acclimatized male and female distance runners during prolonged running in a warm, humid environment. A simulated 40 km race consisting of 100 laps on a 400 m track was completed under ambient conditions of 28-32°C, 65-85% relative humidity. The run was performed at self-selected race pace with monetary rewards based on performance. A 7% carbohydrate-electrolyte beverage was consumed at a dosage of approximately 250 ml every 5 km during the run. Nude dry body weight was recorded before, and after 20 and 40 km of running to calculate sweat rate. Blood samples were obtained by venipuncture before exercise, at 20 and 40 km. Rectal temperature was measured at 20 km, 40 km, and 30-min post-exercise. Heart rate was obtained at 5 km intervals during the run. Mean fluid intake during the run was 1,985 ml or 0.70 l/hr. However, male subjects lost 2.5% and 4.7% of their body weight and females 2.0 % and 3.2% of their body weight at 20 km and 40 km, respectively. Mean sweat rates were 1.8 l/hr for males and 1.1 l/hr for females. Mean plasma volume loss increased significantly ($p < .05$) from 20 km (-7.8%) to 40 km (-13.7%). Heart rate increased significantly over the course of the run from 155 bts/min (81 % HR max) at 5 km to 180 bts/min (94% HR max) at 40 km. Serum sodium increased significantly above resting values (140.3 meq/l) by 3.4% at 40 km. Serum potassium increased significantly above resting values (4.5 meq/l) by 7.3% at 40 km. Core temperature increased significantly from 38.4°C at 20 km to 39.9°C at 40 km and decreased to 38.6°C following a 30 min recovery. The results of this study indicate that despite using a fluid replacement protocol as recommended by ACSM, highly-trained male and female runners experienced significant dehydration, hyperthermia and plasma volume losses during a 40 km run. Therefore, highly-trained runners competing in warm, humid environmental conditions may require fluid intakes above current recommendations.

PREDICTING THE PERFORMANCE OF FEMALE COLLEGE VOLLEYBALL PLAYERS. Chris Hartmann, Kathleen M. Knutzen, Lorraine R. Brilla. Western Washington University, Bellingham, WA 98225.

This study investigated the success of utilizing a variety of different motor and physical ability measures to predict volleyball performance in a game situation. Eighteen female volleyball players (age = 20.1 ±0.9 yrs; ht. = 170.5 ± 4.5 cm; wt. = 64.5 ± 4.7 kg.) were assessed for reaction time, response time, visual acuity, contrast sensitivity, anaerobic capacity and power, agility, vertical jumping ability, and basketball throwing ability. These predictor variables were tested within one week prior to the first day of competition and all tests were collected in a single session. Performance evaluation was carried out over a period of four weekends of tournament play. Volleyball match play was videotaped and later evaluated by one evaluator. A five point index and evaluation was constructed for the skills of serving, setting, blocking, attacking, serve reception, and digging. The physical and motor ability measures were entered into a stepwise multiple regression to assess the strength of predicting each of the volleyball performance variables. Significant prediction equations ($p \leq$).05) were developed for the skills of serving (R=.53), blocking (R=.74), attacking (R=.69), digging (R=.59), and serve receiving (R=.64). No significant prediction equation could be constructed for the skill of setting. Visual contrast sensitivity was found to be the single best predictor for the performance of digging and the maximum vertical block jump was the best predictor for blocking success. Success in attacking, serve receiving, and serving was best predicted using results from the anaerobic capacity and power test (Wingate protocol). These findings suggest that there are specific physical parameters which might be used to predict success in women's volleyball at the collegiate level.

VALIDITY OF THE CALTRAC FOR USE IN MONITORING UPPER AND LOWER EXTREMITY MOVEMENT

Joe F. Smith, Dorrie Bucholtz, Wojtek J. Chodzko-Zajko, Phillip Bishop,
The University of Alabama, Tuscaloosa, AL 35487.

In order to study certain whole body, participant paced activities such as aerobic dance, quantification of arm and leg movements is necessary. The purpose of this study was to determine if a commercially available activity monitor (Caltrac) would discriminate between different heights and speeds of arm and leg movement. The subjects were fifteen volunteers, 10 females and 5 males with a mean age of 24.8 ± 4.3 yrs. Two Caltracs were attached with velcro straps to either both wrists or both ankles. The arms were pumped to a height of 1, 2, and 3 ft. The legs were lifted to heights of 8, 10, and 12 ins. above the floor. Pump and step heights were standardized by requiring subjects to touch a rope stretched between two supports and adjusted for each height. Pumping and stepping frequencies of 100 and 120/min were controlled by a metronome. The arm pumps and leg lifts were performed separately with the frequency and height order being randomized. Activity counts for a two minute period were recorded for each condition. A 2 (frequency) x 3 (height) x 2 (right vs. left) repeated measures ANOVA was used to analyze the data for arm and leg conditions. The means and sd of activity counts for each of the conditions is as follows:

		Arms		Legs	
Speed	Height	R	L	R	L
	1'	7.9±2.0	7.9±1.8	15.5±1.8	14.7±1.7
120/min	2'	12.9±3.0	13.1±2.7	16.1±3.6	16.1±2.5
	3'	18.0±4.0	18.0±3.1	18.6±2.0	17.7±1.3
	1'	6.5±1.5	6.1±1.4	13.1±2.7	12.7±3.2
100/min	2'	10.8±2.0	10.7±1.8	14.2±2.4	14.6±1.8
	3'	14.9±2.3	14.2±2.2	16.8±1.5	15.7±1.7

The faster stepping and pumping frequency produced significantly greater activity counts. Follow-up t-tests for the main effect of height revealed that for the arms, activity counts for the 1, 2, and 3 ft movements were all significantly different. For the legs, the 12 in. lift was significantly different from both the 8 and 10 in. lifts but the 8 and 10 in. lifts did not differ. There were no significant differences between the Caltracs worn on the right and left arms or legs. It was concluded from these data that the Caltrac may be effective in quantifying the amount of arm and leg movement during a variety of physical activities.

COMPARISON OF METHODS FOR DETERMINATION OF MAXIMUM SUSTAINABLE AEROBIC POWER.

Glenn A. Gaesser, Ph.D., University of Virginia.

Seven male subjects were studied while performing cycle ergometry exercise in an attempt to compare methods for estimating maximum sustainable aerobic power. Each subject performed a series of 40-min exercise bouts, each on a separate day, during which time ventilation ($\dot{V}$E) and gas exchange were monitored over time in order to establish the highest power output that could be maintained without a significant rise in $\dot{V}$E over time. These tests established, for each subject, the ventilation threshold for long-term exercise (LTE Tvent; J. Appl. Physiol. 55(6):1694-1700, 1983). Additionally, each subject performed a series of five high-intensity exercise bouts to exhaustion, each on a separate day, for establishing individual hyperbolic power-endurance relationships. The estimated power asymptote ($\hat{\Theta}$PA) of this relationship, extracted by nonlinear regression, theoretically represents the highest sustainable aerobic power output (Int. J. Sports Med. 9(6):417-421, 1988). Group mean (± SEM) LTE Tvent was determined to be 197 ± 12 W (range = 135 to 225 W). For each subject, a power output 15 W above LTE Tvent resulted in a significant ($P < 0.05$) rise in $\dot{V}$E during the 40 min of exercise. Group mean (± SEM) for $\hat{\Theta}$PA of 232 ± 9 W (range = 190 to 274 W) was significantly ($P < 0.01$) greater than the 197 ± 12 W LTE Tvent. For each subject, $\hat{\Theta}$PA was greater than LTE Tvent (range = 11 to 55 W greater; $\bar{X}$ (± SEM) difference = 35 ± 8 W). These data indicate that LTE Tvent and $\hat{\Theta}$PA represent quantitatively different parameters of aerobic function. It is probable that $\hat{\Theta}$PA represents a power output for which a steady state (at least for $\dot{V}$E) cannot be attained.

THE EFFECTS OF VARIOUS LEVELS OF ACTIVITY ON REGIONAL AND TOTAL BODY BONE MINERAL DENSITIES. Eva J. Lee, Kelly A. Long, Hally B.W. Poindexter, Cynthia E. Willis, Human Performance and Health Sciences Department, Rice University and William L. Risser, Department of Pediatrics and Medicine, University of Texas Medical School, Houston.

Studies have shown that athletes with high activity levels have greater bone density than their non-athlete counterparts. However, the type, intensity and duration of the activity still remains a question. This study examined the effects of various levels of prolonged and intense physical training on regional and total body bone mineral densities. Studied were sixty-four women athletes, club sport members and non-athletes (age = 20.48 ± 5.33). Athletes included swimmers (SW, n=8), volleyball (VB, n=11) and basketball (BB, n=9) players, and the club sport participants were soccer players (SS, n=9). Moderately active (MN) and sedentary (SN) non-athletes were determined by their level of activity (SN participated in < 3 hours of activity per week) and a predicted VO_2 max ≥ 30 $ml \cdot kg^{-1} \cdot min^{-1}$ or <30 $ml \cdot kg^{-1} \cdot min^{-1}$, respectively. Bone density was measured by dual photon absorptiometry at the spine, two sites on the femur, ribs, pelvis, trunk, leg, arm, Ward's triangle and total body. Results of the bone density analysis revealed that both VB and BB had significantly higher ($p < .05$) regional and total body bone mineral measurements than SW, SS, MN and SN. However, SW, SS, MN, and SN were not significantly different from each other. The findings indicate that vertical weight- bearing activity involving impact with the ground results in greater bone density. However, the fact that VB and BB show significantly greater bone measurements than SS, even though they are vertical weight-bearing activities raises further question about exercise intensity and duration.

THE EFFECT OF PHYSICAL FITNESS ON BONE MINERAL DENSITY.

Hally B.W. Poindexter, Kelly A. Long, Eva J. Lee, Human Performance and Health Sciences, Rice University and William L. Risser, Departments of Pediatrics and Medicine, University of Texas Medical School - Houston.

The intent of this investigation was to determine if the level of aerobic fitness affected regional and total bone mineral density measurements. Sixty-five subjects (age: 20.05 ± 4.04, weight : 139.16 ± 19.27, height: 67.00± 3.31) performed incremental walking treadmill tests to estimate VO_{2max}. The participants were subsequently placed into one of the following fitness categories: sedentary (SED, < 30 $ml{\cdot}kg^{-1}{\cdot}min^{-1}$), moderately active (MOD, $30 \leq ml{\cdot}kg^{-1}{\cdot}min^{-1} \leq 45$), or active (ACT ≥ 45 $ml{\cdot}kg^{-1}{\cdot}min^{-1}$). Bone mineral density (g/cm^2) of the spine, femur Ward's triangle, femur trochanter, femur neck, leg (LE), arm, L2-4, trunk, ribs, pelvis, and total body plus total body bone mineral content (gms), total bone calcium (gm) and percent body fat (BF) were measured utilizing dual photon absorptiometry. In addition, skinfolds were measures three times at each of seven sites (chest, axillary, triceps, subscapular, abdomen, suprailiac, and thigh) using Harpenden calipers to estimate percent body fat using the Siri equation. Using the MANOVA model, no significant differences ($p > .05$) were found between any of the fitness groups and the measured variables, except for LE and BF. The SED subjects had significantly lower LE (1.19 ± 0.11) and higher BF (28.4 ± 7.06) than the MOD (1.29 ± 0.12, 23.84 ± 4.05) or ACT (1.24 ± 0.10, 20.72 ± 2.76) subjects. In addition, no significant difference were found between the ACT and SED groups on the LE and BF variables. These data suggest that physical fitness positively affected leg bone mineral density and percent body fat but did not significantly affect other regional or total bone mineral density measurements.

THE EFFECTS OF COMPETITIVE SWIMMING ON BONE MINERAL DENSITY.

Kelly A. Long, Eva J. Lee, Hally B.W. Poindexter Human Performance and Health Sciences Department, Rice University and William L. Risser, Departments of Pediatrics and Medicine, University of Texas Medical School - Houston.

The purpose of this investigation was to determine the effects of female swimmers' training upon regional and total body bone mineral density. Thirty five women (age=20.48±5.33) were divided into swimmers (SW), moderately active non-swimmers (MNS), and sedentary non-swimmers (SNS). No significant differences ($p>.05$) were found between the SW, MNS, and SNS for the variables of height, weight, and age. The criteria for being classified as a swimmer included being a member of a competitive university women's swimming team and swimming 3,000-10,000 yards, five to seven days a week. The non-swimmers were classified as moderately active or sedentary if their predicted $\dot{V}O_2$ max ≥ 30 $ml \cdot kg^{-1} \cdot min^{-1}$ or <30 $ml \cdot kg^{-1} \cdot min^{-1}$ respectively and they did not swim or train regularly. Bone mineral density (g/cm2) of the spine, femur Ward's triangle, femur trochanter, femur neck, leg, arm, trunk, ribs, pelvis, and total body, plus total body bone mineral content and total bone calcium were measured utilizing dual photon absorptiometry. Using the MANOVA model, no significant differences were found between the SW and either the MNS and/or SNS for the measured variables. The results of this investigation indicate that the regional and total body mineral density measurements of the swimmers are not significantly different from the moderate or sedentary non-swimmer controls. This may be due to the lack of ground impact during the swimmers' training and competitive season.

THE EFFECTS OF WEIGHT TRAINING, RUNNING, AND COMBINED WEIGHT TRAINING AND RUNNING ON THE STRUCTURE AND FUNCTION OF THE HEART.

Elias, Barbara A., Berg, Kris E., Latin, Richard W., Mellion, Morris B., and Hofschire, Philip J., University of Nebraska at Omaha

The purpose of this study was to compare cardiac structure and function in adult male weight trainers, runners, and those who do both activities. Subjects had actively participated in the various training programs for the previous 5 yr. Mean age ranged from 28.4 to 31.3 yr in the three groups. Echocardiography was used to assess selected heart diameters, volumes, indices of contractility, and thicknesses, while VO_2 max and percent body fat were measured using standard methods. Heart structure and function were expressed in absolute and relative terms i.e., mm/m2 BSA, mm/kg lean body weight (LBW), and mm/kg total body weight (TBW). An alpha level of .05 was used in all comparisons. Results indicated that the runners demonstrated significantly greater relative $LVID_d$, $LVID_s$, and LVPW than the weight trainers. The runner/weight trainers possessed significantly greater relative $LVID_d$, $LVID_s$, LVPW, IVS, LVEDV, and SV than the weight trainers. No significant differences, absolute or relative, existed between the runner and runner/weight trainer groups in any of the myocardial structure and function variables. It was concluded that men who run or run and weight train have similar structural and functional characteristics of the heart, while possessing a number of differences as compared to weight trainers.

COMPARISON OF OPTICAL DENSITY AND SKINFOLD MEASUREMENTS FOR ASSESSING SUBCUTANEOUS FAT by V Hicks, V Heyward, K Jenkins, B Colville, K Cook, J Quatrochi, & W Wilson. Univ. of New Mexico.

Near-infrared interactance (NIR) has been proposed as a field technique for estimating total body fatness from optical density (OD) measurements of regional body fat using the Futrex-5000. However, the potential of using ODs to assess subcutaneous fat, and the effects of age and level of body fatness on ODs has not been determined. We examined the relationship between skinfold (SKF) and OD measurements at various sites, and compared the effects of age and body fatness on these measurements. SKFs and ODs at 9 standardized SKF sites were obtained for 151 women, 20-72 yr. SKFs and ODs were measured in rotational sequence by experienced technicians. In general, there were moderate, positive correlations (r's = 0.30 to 0.77) between ODs and SKFs at each site for women less than 60 yr. However, relationships between ODs and SKFs for the 60+ yr age group were much lower (r's = 0.00 to 0.30). One-way ANOVA indicated the main effect of age was significant for all SKF sites ($p<0.005$), with average SKFs increasing with age. In comparison, only the pectoral, biceps, and abdominal ODs differed significantly ($p<0.05$) across age groups. Average ODs of 20-29 yr and 30-39 yr women were significantly less than those of 50-59 yr and 60+ yr women ($p<0.005$), indicating lower levels of subcutaneous fat in younger subjects at these three sites. Based on the *M* and *s* of the 9 SKFs subjects were categorized into low, medium, and high fat levels to examine the effect of body fatness on the relationships between SKFs and ODs. In the low fat group, there were significant, positive correlations (r's = 0.41 to 0.70) at all sites but the triceps($r = 0.30$), thigh ($r=-0.12$), and calf ($r=-0.16$). Generally, the correlations for the medium fat group were lower (r's = 0.14 to 0.57). In the high fat group, the r's were very low with negative relationships noted for six of the nine sites. However, the average ODs increased significantly ($p<0.005$) across levels of body fatness at all sites but the thigh ($p=0.314$), indicating that ODs can discriminate between levels of body fatness. The low to moderate correlations between ODs and SKFs may reflect differences in methodology. The SKF measures the thickness of subcutaneous fat and two layers of skin; whereas, NIR penetrates up to a depth of 4 cm and, therefore, may be measuring intramuscular, as well as, subctaneous fat. Also, differences in fat layering, as a function of age or body fatness, may explain, in part, the lower correlations between OD and SKF measurements observed for older and obese women. Based on our observations, we conclude ODs should not be used to assess subcutaneous fat in older (> 60+ yr) or obese (Σ9SKF > 263 mm) women.

VALIDITY OF A NEAR-INFRARED SPECTROPHOTOMETRY DEVICE (FUTREX-5000) FOR ESTIMATING BODY COMPOSITION OF ADULT MALES AND FEMALES.

T. R. Crews, R. Farley, R. Cobb, Western Kentucky University, Bowling Green, Kentucky

Near-infrared spectrophotometry (NIR) has recently been introduced as a new technique for assessing body composition. A commercial hand-held NIR instrument (Futrex-5000) has been produced by Futrex, Inc., Gaithersburg, MD. Conflicting reports as to the validity of the Futrex-5000 are found in the literature (Davis, Dotson, & Manny, 1988) and (Israel, Houmard, O'Brien, McCammon, Zamora, & Eaton, 1988). Further study is required to determine the value of the Futrex-5000 as an accurate evaluator of body composition. The purpose of this study was to determine the validity of this NIR device. Informed consent was obtained from 125 adult males and females (mean age = 32.8 yrs., ± 11.4) who volunteered as subjects. Exercise levels of the subjects were: heavy (> 1 hr/day) n = 29; moderate (30-60 min/day) n = 48; light (15-30 min/day) n = 30; and other (< 15 min/day) n = 18. The methodology of the study was to compare NIR with hydrostatic weighing (HW) as a criterion method. The measures for each subject were obtained at one testing session. The order of the HW and the Futrex-5000 assessments were rotated among subjects. To minimize interobserver error, the same researcher performed all residual volume (R = .94) and HW trials (R = .96). Another investigator performed all Futrex-5000 assessments (R = .96). Subjects underwent HW at residual volume. Residual volume was determined using helium-dilution. Ten HW trials were performed with the mean of the final three trials representing the HW. Percent fat was obtained from body density using the Siri equation. The Futrex-5000 procedures were those outlined by the manufacturer (User's Manual, Futrex, Inc., 1988). Optical densities from the manufacturer supplied optical standard were obtained prior to each measure for calibration. Measures were obtained from the anterior midline of the biceps midway between the anticubital fossa and the acrominion process of the right arm. Analysis of the data consisted of a paired "t" test for the absolute values of the differences between the HW and the Futrex-5000 assessments of body fat. This mean difference (3.50 ± SE 0.23) was highly significant ($P < .0001$) when evaluated equal to 0. Further analysis consisted of a multiple regression of Futrex-5000 body fat scores regressed on the dependent variable of HW percent body fat. This analysis produced an R^2 of .7763 and a SEE of 4.26 percent body fat. This suggests that approximately 77% of the variance in the HW percent fat can be attributed to the Futrex-5000 bicep measurement while the SEE indicates that only 68% of the subjects would have their Futrex-5000 score within 4.26 percent body fat of the criterion (HW). In conclusion, the results of this study suggest that the Futrex-5000 was not accurate in estimating body composition of adult males and females.

EFFECTS OF FOOD INGESTION AND EXERCISE ON BODY COMPOSITION MEASUREMENTS.

Chester J. Zelasko, SUNY College at Buffalo; William W. Heusner, Michigan State University

Body composition estimations using hydrostatic weighing are typically measured in the early morning after the subjects have fasted overnight and before exercise or exercise testing. The purpose of this study was to determine the effects of food ingestion and a moderate bout of exercise on estimates of body composition. Twenty-four healthy men and women between 20 and 30 years of age volunteered for the study. Land body weight was measured using a balance beam scale (±.1 kg). Underwater weight was measured using a strain gauge coupled to a chart recorder. The lung volume was measured by closed-circuit nitrogen dilution (Med-Science 505) at the time of the underwater weighing. Body density was determined by the Brozek formula and converted to percent body fat by the Siri formula. Subjects were allowed to eat ad libitum during meals. Exercise sessions were maintained at moderate levels (60-70% of the heart rate reserve). All subjects were weighed under the following experimental conditions: pre-breakfast, post-breakfast, pre-lunch, post-lunch, pre-exercise, and post-exercise. Measurements were taken before and one-half hour after meals and exercise with four hours between meals and four hours between meals and exercise. The data were analyzed using analysis of variance with planned and post-hoc comparisons. There were statistically significant increases in land body weight ($P <.01$) after the ingestion of food at both meals. Body weight decreased significantly after a moderate bout of exercise ($P < .01$). There were no significant differences in percent body fat estimates related to food ingestion. There was a significant decrease ($P <.05$) between the pre-breakfast percent body fat and the post-exercise percent body fat. While food ingestion does increase body weight, estimates of percent body fat using hydrostatic weighing are not effected. The results of this study indicate that hydrostatic weighing provides reliable estimates of body composition at different times of the day with subjects at varying stages of food digestion. The research design did examine all possible combinations of food ingestion and exercise. Therefore, further research is necessary to examine other combinations.

BIOELECTRIC IMPEDANCE VS UNDERWATER WEIGHING IN BLACK WOMEN

P.B. Sparling, M.L. Millard-Stafford, L.B. Rosskopf, L.J. DiCarlo and B.T. Hinson, Health and Performance Sciences, Georgia Institute of Technology, Atlanta, GA 30332-0110

Body composition predictions typically based on white or predominantly white samples are routinely applied to blacks. Since minimal body composition data are available on blacks, it is difficult to assess whether generalization is appropriate. We compared estimates of % fat from bioelectric impedance assessment (BIA) to those from underwater weighing (UWW) in 98 young adult (18-40 yr) black women (Ht = 166.2 cm ± 6.4, Wt = 61.7 kg ± 8.2). Data from a similar group (n = 116) of white women (Ht = 165.9 cm ± 6.7, Wt = 59.7 kg ± 8.0) were also collected and are presented for comparison. All measurements were done in the morning following an overnight fast. Whole body bioresistance (R) was measured using a RJL Instrument Model BIA-101. Subjects were measured on the right side in the supine position. Fat free mass (FFM) was predicted from the Lukaski et al. (1986) equation [$FFM = 0.821 (Ht^2)/R + 4.917$]. Following BIA, body density (D) was determined by UWW with residual lung volume determined simultaneously using a closed-circuit, oxygen rebreathing, nitrogen-dilution method. Percent fat was calculated using the Brozek et. al. (1963) equation (% Fat = 457/D - 414). Mean (± SD) values were:

		UWW	BIA	DIFF	
Black Women	% Fat	22.8 (6.2)	30.2 (7.0)	7.4*	$(p < 0.01)$
	FFW (kg)	47.6 (5.8)	42.7 (5.1)	4.9*	
White Women	% Fat	23.6 (5.4)	25.7 (6.7)	2.1*	$(p < 0.05)$
	FFW (kg)	45.6 (6.1)	43.7 (5.0)	1.9*	

The criterion measure of % fat by UWW was not significantly different between the black and white women. Among the black women, % fat by UWW was significantly over-predicted using BIA by 7.4 percentage points. Among the whites, a slight but significant over prediction was observed, similar to that reported by Graves et. al. (1990) using the same instrument and equation in a comparable group of white women. The magnitude of over prediction in the blacks using BIA compared to the whites ($p < 0.01$) is due to the consistently higher bioresistance values (608 ± 71 vs 590 ± 60). Based on these findings, it is recommended that a new or revised BIA prediction equation be developed for black women.

THE EFFECT ON THE ANALYSIS OF GROUPING DATA BY SOMATOTYPE COMPONENT OR BY SOMATOTYPE DOMINANCE.

William W. Bolonchuk, USDA-ARS Grand Forks Human Nutrition Research Center and the University of North Dakota; Henry C. Lukaski, USDA-ARS Grand Forks Human Nutrition Research Center; William A. Siders, USDA-ARS Grand Forks Human Nutrition Research Center.

Some studies that have examined the association between somatotype and performance compared a measure of performance with the rating for each somatotype component while others analyzed performance measures after the data were grouped by somatotype. No evidence exists to determine the effect on the sensitivity of the analysis from grouping data, so this project was designed to study that question. A sample of 82 adult males performed tests of body composition by hydrodensitometry, physical work capacity by a standard work test on a cycle ergometer and plasma analysis for lipids, metals and enzymes. Correlation estimates were computed between the somatotype ratings and the measurements which were grouped two ways, by somatotype component (N=82) and by somatotype dominance (n=19 endomorphs, n=41 mesomorphs and n=22 ectomorphs). Correlations between percent fat, fat weight and somatotype dominance remained unchanged for the endomorphic group and increased (r=.33 to .43 and .45 to .57, respectively) for the mesomorphic group; however, the correlation between the endomorphic group and fat-free weight decreased (r=.31 to .04) and the correlation between the mesomorphic group and fat-free weight was unchanged. These changes in fat weight and fat-free weight tend to complement one another and combine to differentiate the body composition of the endomorphic group from the mesomorphic group when the data were grouped by somatotype dominance. Analysis of physical work capacity measurements indicated that correlations for maximum power output, expired volume, oxygen consumption and carbon dioxide production increased and respiratory equivalent ratio decreased when the measurements were grouped by somatotype dominance. Correlations between plasma metals and the endomorphic and ectomorphic groups were unaffected by the groupings for analysis. The mesomorphic group showed a small increase in all plasma metal correlations (Zn, r=.10 to .27; Cu, r=-.08 to .28; Fe, r=-.06 to -.11; Ca, r=.22 to .35) except for plasma Mg which remained unchanged (Mg, r=.22 to .21). Correlations for plasma lipids were increased for the endomorphs, mesomorphs and ectomorphs when the data were grouped by somatotype dominance. Although some correlation estimates remained unchanged, the general effect of grouping by somatotype dominance was to increase the correlation estimate between the performance measures and the somatotype.

MUSCULAR POWER OF THE ARMS IN HIGH SCHOOL WRESTLERS.

T. Housh, J. Eckerson, S. Evans, G. Johnson, and J. Weir. University of Nebraska-Lincoln.

The purpose of this investigation was to examine age-related changes in the muscular power of the arms in high school wrestlers. Seventy-five high school wrestlers (X age ± SD = 16.3 ± 1.2 yrs) volunteered to perform an arm cranking Wingate Anaerobic Test (WAT) for the determination of peak power (PP) and mean power (MP) as well as underwater weighing for the determination of body composition. The subjects were divided into four groups corresponding approximately to the ages of high school freshmen, sophomores, juniors and seniors: Group 1 (G1) = ≤ 15.00 yrs, n=14; G2 = 15.01-16.00 yrs, n=19; G3 = 16.01-17.00 yrs, n=19; and G4 = > 17.00 yrs, n=23. One-way ANOVA with Tukey post-hoc comparisons indicated significant ($p < 0.05$) differences between G1 and G4 for PP (X ± SEM: G1 = 366 ± 27 watts vs. G4 = 440 ± 19 watts) and MP (G1 = 281 ± 17 watts vs. G4 = 342 ± 14 watts). ANCOVA analyses were used to examine group differences in PP and MP controlling independently for body weight (BW) and fat-free weight (FFW). For PP covaried for BW, G4 (422 ± 8 watts) was greater than G1 (390 ± 10 watts) and G2 (388 ± 9 watts) while G3 (413 ± 9 watts) was greater than G2. For MP covaried for BW, G4 (330 ± 7 watts) was greater than G1 (298 ± 9 watts), G2 (304 ± 7 watts) and G3 (308 ± 7 watts). When PP and MP were covaried for FFW there were no significant ($p > 0.05$) differences between the groups. MP and PP were highly correlated at $r = 0.94$. First-order partial correlations for age vs. PP and MP controlling for BW were significant ($p < 0.05$) at $r = 0.33$ and 0.36, respectively. However, the relationships for age vs. PP and MP controlling for FFW were not significant ($p > 0.05$) at $r = 0.02$ and 0.09, respectively. Recent studies have identified an age-effect in the muscular strength of the arms and shoulders of high school wrestlers that could not be accounted for by changes in BW or FFW. The results of the present investigation however, indicated that the enhanced muscular power of the arms exhibited by wrestlers during the high school years was a function of increases in FFW. Thus, these findings suggest differences in the developmental characteristics of muscular power when compared to strength across adolescence.

PREDICTION OF $\dot{V}O_2$MAX IN BOYS, AGES 11 TO 14 YEARS

Loren D. Erdmann, Larry D. Hensley, Forrest A. Dolgener,
University of Northern Iowa

There has been recent and widespread interest generated by the Rockport Walking Test for predicting fitness levels. Because this test was developed on an adult population and no similar test is available for kids, the purpose of this study was to determine if a walk-type test could be used to develop an appropriate equation for predicting $\dot{V}O_2$max in young boys while still maintaining utility in the school setting. Subjects were 67 boys, ages 11 to 14 years. $\dot{V}O_2$max was determined using a continuous, multi-stage treadmill protocol. Predictor variables were time in a 800 yard shuttle walk, post-heart rate, height, weight, sum of triceps and subscapular skinfolds, and exercise history. A stepwise, multiple linear regression analysis was used to generate prediction equations. Results indicated that the time for the shuttle walk and the post-walk heart rate were poor predictors of $\dot{V}O_2$max. The best equations that would have utility in the school setting were as follows:

$$\dot{V}O_2\text{max (ml/min)} = -1329.716 + (17.385 * \text{WT}) + (40.297 * \text{HT}) - (22.955 * \text{SUMSKF});\ R = 0.88,\ \text{SEE} = 0.292$$

$$\dot{V}O_2\text{max (ml/kg min}^{-1}\text{)} = 62.528 - (0.446 * \text{SUMSKF})\quad R = .80,\ \text{SEE} = 5.0$$

Where: WT = body weight in pounds
HT = height in inches
SUMSKF = sum of triceps and subscapular skinfolds in mm

It was concluded that the additional effort necessary to administer a shuttle walk test did not provide sufficient improvement in predicting $\dot{V}O_2$max to warrant including it. However, simple physical measurements appear to provide a reasonable prediction of $\dot{V}O_2$max in this age group of boys.

RELATIONSHIP OF ABSOLUTE STRENGTH AND RELATIVE ENDURANCE IN FEMALES.

Robert L. Johnson, Michael H. Stone, Cannon Cameron, and Valerie Midgett, Appalachian State University, Boone, NC.

The relationship of absolute strength to relative endurance has been of interest to researchers for a number of years. Most studies in this area have used repetitions completed at each percentage of maximum (1RM) as the indicator of relative endurance and concluded that no relationship existed between absolute strength and relative endurance. The purpose of the present study was to investigate the relationship of absolute strength (1RM) to relative endurance expressed as load (repetitions x mass) in women. Twenty-five females (aged 20.6±1.6 yrs) volunteered for the study. The subjects performed maximum parallel squat efforts (1RM) and were divided into three statistically different strength groups based upon 1RM results. Each subject then performed maximum repetitions at 70%, 80%, 90%, and 95% of 1RM. Performance at each percentage was counterbalanced and on alternate successive days. Load was calculated at each percentage. Data were analyzed using group x trials repeated measures analysis of variance. No significant differences occured in repetitions performed among the three strength groups. Significant differences in load were revealed ($p<.05$) as well as a significant load x group interaction ($p<.05$). Results suggest that stronger females have greater muscular endurance when endurance is expressed as load.

			LOAD(kg)			
	N	1RM (kg)	70%	80%	90%	95%
Gp 1	9	44.9±4.9	506.8±336.3	391.9±226.6	281.3±112.4	210.1±96.1
Gp 2	11	59.5±8.5	687.8±449.6	392.7±363.2	311.0±150.9	157.9±108.7
Gp 3	5	82.7±14.1	1119.5±717.7	928.6±661.3	422.7±362.5	394.5±307.0

Compared to previous research using small muscle mass exercises, the present study suggests that the 1RM is related to muscular endurance when using large muscle mass exercises.

LOW BACK/TRUNK FLEXIBILITY IN YOUNG CHILDREN.

Cheryl Norton, Mark Harvey, Carol Borman, Metropolitan State College of Denver; Betty Versteeg, Denver Public Schools.

Flexibility is considered to be a primary component of physical fitness. Of particular interest to physical educators has been low back/trunk flexibility as measured by a sit and reach test. Although normative data for this test exists for all school-age groups, little information is available regarding a program educators could implement to improve this flexibility score. This study was conducted to identify the effectiveness of a 10 minute flexibility program participated in during an 8 week training period. In addition, retention of gained flexibility was measured 8 weeks post-training. The subjects were 161 first and second grade students divided into a control group (Group I), 3 time (Group II) and 5 time (Group III) a week exercise groups. All subjects were initially evaluated on a sit and reach test, then 2, 5 and 8 weeks during the training period and 2, 5 and 8 weeks post-training. A multivariate analysis of variance (MANOVA) with repeated measures was conducted to determine if there was a change in flexibility measure by group. Paired T-tests were conducted separately for each group to determine when significant changes in sit and reach scores first occured. Significance was determined at the $P < 0.05$ level. The control group showed no significant improvement in the test score throughout the study. Both of the exercising groups significantly improved their scores. However, Group III significantly improved within the first two weeks of exercise. Group II significantly improved only after five weeks of training. Percentile scores indicated Group III improved 15 percentile points after 8 weeks of training and retained 2/3rds of this increase 8 weeks post-training. Group II showed only a 7% improvement. This study suggests that a significant improvement can be made in flexiblity with a 5 time a week program conducted for two weeks. With less exercise, improvement is slower in occurring and does not represent as large an increase. A significant improvement in flexibility can be retained for at least 8 weeks post-training in young children. Thus, physical educators do not need to concentrate every class period on flexibility exercises to maintain low back/trunk flexiblity but rather can successfully intersperse this exercise into the curriculum and still maintain improved fitness scores.

IS VO_{2max} AN APPROPRIATE CRITERION FOR ASSESSING ONE-MILE RUN/WALK TIME IN CHILDREN AGED 6 TO 13 YEARS?

C.B. Ebbeling, E. Puleo, A. Ward, S. Damitz, E. Peterson, J.M. Rippe,
University of Massachusetts Medical Center.

The one-mile run/walk test has been used extensively as an index of aerobic power in school children. While standards have been developed to interpret test performance using maximal oxygen uptake (VO_{2max}) as a criterion, there is little empirical data relating test performance to VO_{2max}. Thus, the primary purpose of the present study was to assess the relationship between one-mile run/walk time and VO_{2max} for children aged 6-13 y. Subjects (77 boys, 54 girls) completed both a maximal treadmill test with direct measurement of VO_{2max} and a one-mile run/walk test on a measured track. Heart rates were recorded during both tests using a Vantage heart rate monitor, and the percentage of treadmill peak heart rate utilized during the run/walk test was employed as a measure of exercise intensity. Multiple regression analyses were used to assess the variance in one-mile run/walk time among children in four gender/age groups that could be attributed to differences in VO_{2max} ($ml \cdot kg^{-1} \cdot min^{-1}$). Subsequently, exercise intensity (EI, %), height (HT, cm), sum of triceps and calf skinfolds (SF, mm), and waist girth (WG, cm) were added to the stepwise analyses to determine if some of the variance not attributed to differences in VO_{2max} could be explained by these variables. The R^2 values listed below indicate the percentage of variance in one-mile run/walk time explained by the variables included in the regression analyses.

	Boys		Girls	
	6-9 y	10-13 y	6-9 y	10-13 y
VO_{2max}	50.1	60.7	38.7	31.8
EI	20.0	13.7	9.6	----
HT	5.4	4.6	----	----
SF	----	----	----	16.9
WG	----	----	----	10.4
Explained Variance	75.5	79.0	48.3	59.1

The variance in one-mile run/walk time attributed to differences in VO_{2max} was greater for the boys compared to the girls. Except for the girls aged 10-13 y, EI was a significant determinant of test performance. For this older group of girls, variables related to body composition (SF and WG) accounted for nearly as much variance in one-mile run/walk time compared to VO_{2max}. In conclusion, since differences in VO_{2max} accounted for only 31.8% to 60.7% of the variance in one-mile run/walk time, the use of VO_{2max} as a criterion for interpreting test performance should be questioned and warrants further investigation.

EDUCATION TO IMPROVE THE IMPACT OF CHOLESTEROL SCREENING ON YOUNG ADULTS.

John K. Scheer, Richard Schmidt, and Steven Wise, University of Nebraska-Lincoln.

The expert panel of the National Cholesterol Education Program (NCEP) has strongly recommended blood cholesterol screenings for all adults aged 20 and over. A recent study, however, found that the impact of a cholesterol screening on the health knowledge retention of a young adult population was disappointing. The purpose of this study, therefore, was to determine the effect of a 12 minute instructional videotape on the health knowledge gains and behavior changes of college students undergoing a cholesterol screening. Subjects (n=145; 106 females, 39 males; 21.2 ± 4.0 years of age) were enrolled in a self-paced personal fitness course, for which a cholesterol screening was a routine requirement, at a major midwestern university. Student Health Center technicians conducted the screening using an Abbott Vision machine to assess finger stick samples of blood. During the screening, subjects were given an instructional handout, and the technician discussed educational information from the NCEP. Subjects were then randomly assigned into one of three groups. Group 1 received no additional education beyond that given during the screening, group 2 viewed a 12 minute instructional videotape, and group 3 viewed the same videotape while completing an accompanying study guide. The videotaped lecture reinforced NCEP information given during the screening, and targeted subjects at the high end of the desirable range (180-199 mg/dl) and higher ($\geq$200 mg/dl) to take steps to keep cholesterol levels under control, since values track upward by 50 to 60 mg from the early 20s to the late 50s. Ten weeks later, subjects completed a follow-up questionnaire which revealed that 72% remembered their cholesterol level exactly, while an additional 17% were within 10 mg of the correct value. Chi square analyses revealed no significant differences between expected and observed frequencies for educational group by health knowledge retention on questions related to the importance of blood cholesterol (60% correct), NCEP cholesterol categories and corresponding values (only 18% correct), and the upward trend of cholesterol from the early 20s to the late 50s (29% correct). However, analysis did reveal knowledge of appropriate follow-up to be dependent upon group ($p<.001$), with subjects in groups 2 (93%) and 3 (87%) correctly identifying the date of their next suggested screening more frequently than subjects in group 1 (65%). In addition, subjects at or above 180 mg/dl remembered their cholesterol values more frequently if they were in group 2 or 3 than group 1 ($p<.01$). Finally, subjects below 180 mg/dl were more likely to report diet changes if they were in groups 2 or 3 than group 1 ($p<.02$). It would seem that the addition of a short audio-visual program to the educational efforts which accompany most cholesterol screenings would have some desirable impact on young adult populations. If the NCEP continues to suggest screenings for young adults, then research should continue on ways to improve the impact of such screenings.

THE RESULTS OF MANDATORY COMPLIANCE TO AN EXERCISE AND WEIGHT LOSS PROGRAM AMONG HIGH RISK SOUTHWESTERN THEOLOGICAL SEMINARY STUDENTS

Fred Fridinger, DrPH, Pamela Moorhead, MS, University of North Texas

This study compared the effects of a mandatory versus voluntary fitness and dietary assessment and counseling program designed to reduce coronary risk factors related to diet and exercise among graduate students attending a southwestern theological institution. The subjects (N=41) were mostly in their early thirties, married and male. Subjects were placed in the manda-group (n=19) or voluntary group (n=22) if they exhibited either a systolic BP $>$ 140 mmHg or a diastolic BP $>$ 90 mmHg, elevated body fat (22% for males and 29% for females), or a high total serum cholesterol $>$ 200 mg/dl. The initial screening included a comprehensive fitness assessment that included a maximal treadmill test, a 1-hr. counseling session concerning their results, a 3-day nutritional analysis and recommendations for a 10-week exercise program. Those in the mandatory group who were required for academic admission to participate in the assessment were also required to meet with the program staff at the end of each semester to monitor their progress. Post-program measures included BP, body fat, total serum cholesterol as well as exercise and weight loss behaviors. A Health Perception Scale (HPS) was also administered to assess changes in attitudes and beliefs over the follow-up period (from 4 to 20 months). The results of the post-program assessment revealed positive changes in all physiological and behavioral measures. Significant changes regarding body fat % (*M* decrease=2.68%, $p<.001$) and diastolic BP (*M* decrease=8.11 mmHg, $p<.001$) were found for the mandatory group. Total serum cholesterol levels decreased significantly for the voluntary group only (*M* decrease=17.43 mg/dl, $p<.01$) from 208.86 mg/dl at Time 1 to 192.29 mg/dl at Time 2. Significant reductions in diastolic BP and body fat % were also experienced by the voluntary group subjects. The number of subjects in the mandatory group that exercised at Time 2 improved significantly (X2=6.94, p=.0084), yet still showed a significantly less positive attitude toward exercise. Overall, the fitness assessment and counseling were found to be successful for both groups, with no real advantage to mandatory compliance to a health behavior change program.

THE EFFECT OF A CLINICALLY BASED CHD RISK INTERVENTION ON DIET AND EXERCISE ADHERENCE AND CONSEQUENT PLASMA CHOLESTEROL PROFILE

L. Taylor, S. Fuller, A. Knehans, R. Ratliff & T. Coniglione, Human Performance Laboratory, University of Oklahoma

Purpose: The purposes were to investigate the relationship between: 1) program participation and client diet and exercise adherence levels and 2) diet and exercise adherence levels and changes in plasma cholesterol profile. **Methods**: Forty-one middle aged ($\bar{X}$ 46.5 yrs) subjects (31 males; 10 females) with total cholesterol levels greater than 200 mg/dl received an extensive medical evaluation including lipid profile, diet and exercise instruction, and recommendations for lifestyle modification which were consistent with reduction of CHD risk. The intervention lasted for four months. Subjects pre-intervention diet and exercise habits were assessed and adherence patterns were charted throughout the intervention phase. **Findings**: All of the 41 subjects improved diet and/or exercise adherence levels; 34 both diet and exercise, six only diet and one only exercise adherence levels. A sign test indicated these adherence "migrations" to be significant ($p<0.05$). Paired comparison dependent t-tests were used to evaluate changes in pre and post cholesterol concentrations. Reductions in total cholesterol (↓ 13%) and LDL cholesterol (↓ 15%) were significant ($p<0.05$) among subjects who improved both their diet and exercise, or only diet adherence levels. HDL cholesterol was not significantly altered based on adherence patterns. **Conclusion**: Data indicate that program particiaption can result in short term diet and exercise adherence with only periodic intervention. Further, adherence changes were favorably associated with desirable changes in the total cholesterol and LDL cholesterol profile. It is probable that the exercise intervention program was not sufficient to meet the proposed dose-response (time and/or amount) requirement to raise HDL-C levels.

AN ANALYSIS OF NEWSLETTER FEATURES PERCEIVED AS VALUABLE BY WORKSITE HEALTH PROMOTION DECISION-MAKERS

Richard E. Miller, Ed.D. and Thomas J. Golaszeski, Ed.D., George Mason University

Health newsletters are increasingly becoming a component of worksite health promotion programs. Estimates, for example, range from 5 to 10 million subscriptions are sold per year by commercial firms to employers. However, despite increasing use, virtually no data exist on the selection criteria for newsletter purchase. Therefore, the purpose of this research was to determine which features are perceived most valuable in the newsletter selection process by typical workplace decision-makers. Five leading commercial health newsletters were submitted to decision-makers for review. Human resource (HR) directors (100) and benefits managers (100), and health/fitness (H/F) professionals (100) were randomly selected from the directories of The American Society for Personnel Administration, and The Association for Fitness in Business, respectively. From these lists, 60 HR directors, 64 benefits managers and 65 H/F professionals agreed to participate (n =189) in the study. A total of 117 respondents (37 HR directors, 35 benefits managers and 45 H/F professionals) provided the data (60.3 percent). A semantic differential questionnaire was contructed to measure perceived value along a one to seven continuum of 17 newsletter features. After calculating descriptive statistics, a correlational analysis was performed to determine the relationship of each newsletter's feature to selection preference (defined as likelihood to purchase). Nine of the 17 newsletter features (content-interesting, content-useful, content-motivating, pictures attention-getting, style supports messages, overall attractiveness, overall motivational quality, personal value and purchase value) having higher correlational coefficients (r ≥ .43., p.≤ 001) were included as independent variables in a step-wise multiple regression with newsletter selection preference as the dependent variable. Content-useful and content-motivating, and overall quality valuable and worth buying were major predictors of the decision-makers' newsletter selection preference, accounting for 65% of the predictable variance. To confirm this finding, the mean scores on these four features were compared the highest and lowest rated newsletters. Significant differences were noted between the two newsletters for each of the four variables (p.≤.001). In conclusion, findings from this study have significance to workplace health education professionals who may be designing an internal health newsletter or considering purchase from a commercial vendor. Without consideration to price or sales process, worksite decision-makers have clear preference for newsletter features. Having written content that is both useful and motivating, and having high perceived personal and purchase value (overall quality, worth buying) are considered more important from the decision-maker's perspective when commit resources to a health newsletter.

PARTICIPATION AND TRENDS IN VIGOROUS PHYSICAL ACTIVITY OF AN ADULT POPULATION.

Steven G. Aldana and William J. Stone, Arizona State University

Physical activity surveys of adults conducted over the past two decades have reported a wide variety of results, ranging from under 20 percent to over 70 percent. A major confound in comparing survey results involves the varied definitions which have been used to determine regular and vigorous physical activity. The standard criterion as defined by the Center for Disease Control of +3Kcal/kg/day was used in this study. It is based upon the guidlines for minimum health benefits as established by the ACSM. The purposes of this study were to 1) determine the percent of adults who meet the defined criteria for regular, vigorous physical activity; 2) compare the results of this study with the findings of previous studies which used the same definition of vigorous physical activity; and 3) determine the extent to which adult exercise Objectives of the Nation are being met during the years 1986 through 1989. Information on physical activity was gathered by survey from employees and their dependents from 1986 to 1989 (n=30,984). Data were collected on the frequency and duration of 14 physical activities. Using body weight and tables of caloric expenditure per activity per minute, participants were catagorized into one of three different levels of physical activity (inactive, intermediate activity and vigorously active). Results indicated that 24.3 percent of the total population were engaged in vigorous physical activity which is up 6.3 percent from similar surveys conducted 10 years ago. More males (30%) than females (20%) exercised vigorously. Males and females under the age of 20 had the highest percentage of subjects exercising in the vigorous category. Interestingly, after the age of 55 the percentage of adults engaging in vigorous physical activity increased with age. Of the total population, 45 percent were considered to be inactive. The National Objective of 60 percent participation rate in vigorous physical activity among adults is not being met based upon the mid-decade data, and the results of this survey.

SYMPOSIUM: CONSIDERATIONS FOR MONITORING CHOLESTEROL

Elevated serum cholesterol is one of the primary risk factors for coronary artery disease. A wealth of evidence exists identifying various interventions such as exercise, diet, weight loss, as well as medications that are effective in lowering serum cholesterol. Additionally, sufficient evidence is available showing that lowering cholesterol will lower the risk of coronary artery disease. The National Cholesterol Education Program has recommended that all individuals over the age of 20 have their cholesterol concentration determined to identify individuals at risk for developing coronary artery disease. Recently, recommendations have also been made to begin screening children for elevated cholesterol. The purpose of this symposium will be to review the important issues related to monitoring cholesterol.

VALIDITY AND PRECISION OF CHOLESTEROL MEASUREMENTS.

Leonard A. Kaminsky, Ball State University

The Laboratory Standardization Panel of the National Cholesterol Education Program has set guidelines for accuracy and precision of cholesterol measurements. The current goals are ± 5% for accuracy compared to the national laboratory reference method and ± 5% for precision (assessed by the coefficient of variation), with standards improving to ± 3% for both accuracy and precision by 1992. Two major sources of variability, technical (analytical) and biological (seasonal) in cholesterol testing have been identified. Factors contributing to both technical and biological sources of variability will be discussed with recommendations provided for controlling variability. Special consideration will be given to the portable, dry-chemistry analyzers that can be used for mass screenings and/or for on-site testing.

WHAT YOU NEED TO KNOW ABOUT AEROBIC EXERCISE & CHOLESTEROL. Mitchell H. Whaley, Ball State University

The role of endurance exercise training in modifying blood cholesterol has been studied and debated for several decades. Early crossectional studies reported that runners had more favorable lipid profiles when compared to sedentary individuals. However, the results of more recent endurance training studies have not demonstrated the same magnitude of beneficial effect inferred from the comparison studies. Many of these studies, suffering from a small sample size, or subjects with normal lipid profiles, concluded that total cholesterol changes little following endurance training. This presentation will discuss changes in blood lipid profiles following endurance training, in a large (N=550) 3-4 month, adult exercise study, and attempt to identify several factors which account for the discrepancies among early training studies.

ON-SITE SCREENINGS FOR CHOLESTEROL

Wes Alles, Stanford University

The advent of portable, dry-chemistry analyzers has made it feasible for cholesterol screening of large groups of individuals. These analyzers provide results within minutes of the test, obtain samples from a fingerstick with minimal discomfort, and have a relatively low cost per test. Reports concerning the efficacy of the use of these dry-chemistry systems have been mixed. A variety of factors such as quality control procedures, training of operators, whole blood fingerstick samples vs. venipuncture serum samples, and interpretation of the results will be reviewed. Specific recommendations will be given for implementing a screening program. The importance of providing educational information concerning modifying serum cholesterol (as well as other coronary artery disease risk factors) and having a follow-up plan will be discussed.

A COMPARISON OF A TRADITIONAL INSTRUCTION PROGRAM AND NEUROMUSCULAR PROGRAMMING IN THE MOTOR SKILL PROFICIENCY ACQUISITION OF A CLOSED MANIPULATIVE SKILL.

W. Harvey Poole, III, University of Southern Mississippi.

The investigation and experimentation of different approaches to learning a motor skill have been universally pursued. The purpose of this study was to determine if neuromuscular programming, that is observation of repetitive perfect performance, would allow for a more rapid acquisition of a closed manipulative skill than the traditional skill instruction method. The subjects participating in this study were 44 university students enrolled in two physical education golf classes. One class (N=20) was assigned to neuromuscular programming and the other (N=24) to traditional instruction. Each class met for 16 fifty minute sessions over an eight week period. Subjects were videotaped performing the full golf swing with a standard five iron prior to session one and after session sixteen. The tapes were independently viewed and evaluated by four PGA Class A teaching professionals. Treatment for the neuromuscular programming subjects consisted of each session following a format of two minutes of eyes-closed relaxation, 27 minutes of viewing 240 repetitive perfect swimngs on video tape with no verbal clues, three minutes of eyes-closed self visualization of the golf swing as viewed, three minutes to move to the practice area, and 15 minutes of subject performance practice with no verbal clues. The traditional instruction treatment intervention consisted of 5 to 8 minutes of verbal presentation and 42 to 48 minutes of student performance practice with concurrent corrective feedback from the instructor, an LPGA certified teaching professional. The data were subjected to statistical analysis to determine means, standard deviations, and significance. Significance ($p>.05$) was found in the skill acquisition within each of the groups, however there was no significant difference between the two groups. This seems to imply that in the absence of an "expert" instructor, neuromuscular programming may be the preferred method of teaching a closed manipulative motor skill.

VISUAL PRETRAINING EFFECTS ON COINCIDENT TIMING SKILL ACQUISITION AND RETENTION. Tracy L. Pellett, Ball State University.

The purpose of this study was to determine the effects of visual pretraining on coincident-timing skill acquisition and retention. Three groups of subjects (n = 15 per group) received varied visual pretraining experiences by viewing stimulus lights on a Bassin Anticipation Timer runway before being transferred to active timing performances (acquisition and retention phases). The blocked pretraining group (BP) received visual pretraining experiences at three different stimulus velocities (12.8, 17.6, 22.4 k/h) so that 20 trials at each velocity were viewed before being transferred to the active coincident-timing condition. The paired pretraining acquisition group (PPA) also received pretraining experiences. However, active performance trials immediately followed presentation of each stimulus condition. The no-pretraining group (NP) received no pretraining experiences. The results demonstrated a trend for all groups to improve during acquisition. In addition, the PPA group performed with less absolute timing error during the acquisition phase at all stimulus velocities as compared to the BP and NP groups. However, this advantage was not apparent during the retention phase. Analyses of constant and variable timing error demonstrated no significant differences between any of the three groups during the acquisition or retention phases for all velocity conditions. In addition to timing error, three aspects of the arm trajectory were measured: time to react to the initiation of the light sequence, time to traverse the first half of the movement, and time to traverse the second half of the movement. Analyses on reaction time and segment one time showed all groups to perform similarly during both the acquisition and retention phases for all velocity conditions. However, the PPA group was found to be significantly less variable than the BP or NP groups during acquisition at all velocity conditions when the standard deviation of segment two time was analyzed. This effect was not present in retention. The results suggest that visual pretraining which emphasizes pairing pretraining with actual practice can decrease general timing error in acquisition.

222

BEST COPY AVAILABLE

PROGRAMMING TIME AS A FUNCTION OF DIRECTIONAL ACCURACY DEMAND

Ben Sidaway, Department of Kinesiology, Louisiana State University.

Following the pioneer work of Henry and Rogers (1960) researchers have investigated the response complexity effect on programming time with many concluding that the number of movement parts within the response is the key programming variable. Recently, however, Sidaway et al. (1988) have argued that many of these experiments have overlooked the directional accuracy demand of the response that has often varied concomitantly with the number of movement parts. The current experiment was designed to examine the relative effect on programming time of number of movement parts and directional accuracy demand in an upper limb target tapping response. The experiment replicated 3 of the conditions used by Fischman (1984). Fischman's data has previously been taken as support for the effect of number of movement parts on programming time. Six right-handed males participated in 5 conditions, each of which required either a single or a series of targets to be hit as rapidly and accurately as possible with a hand-held stylus. A simple reaction time (SRT) paradigm was employed with an auditory imperative signal, a constant foreperiod, and 20% catch trials. The targets were 6 cm diameter circular brass plates arranged at 10 cm intervals to the left of the start position. In the multiple target conditions subjects had to strike 3 or 5 targets in a sequential manner. In the single target conditions subjects had to strike a target either 10, 30, or 50 cm from the start. The 30 and 50 cm targets thus replicated the directional accuracy demand of the last target in the 3 and 5 tap sequential conditions. Directional accuracy demand was quantified by the minimal angle subtended at the start position by the diameters of the targets in the response. Subjects performed 40 trials in each condition. Analysis of variance revealed a main effect for directional accuracy, $F=17.3$, $p<.05$, but no main effect for number of movement parts, $F<1$. Newman-Keuls post-hoc analysis revealed that SRT means for the 3 levels of directional accuracy demand all differed significantly from each other. SRT increased as the minimal subtended angle of the response decreased. Speed-accuracy and SRT/movement time (MT) trade-offs were ruled out. Analysis of the MT data revealed that MT lengthened as both accuracy demand and number of movement parts increased. The SRT data are taken as support for Sidaway et al.'s hypothesis that directional accuracy demand plays an important role in determining the length of the motor programming process and also question the conclusions of response complexity studies that have not taken into account differences in directional accuracy demand.

THE EFFECTS OF CONTEXTUAL INTERFERENCE AND ENVIRONMENTAL CONTEXT ON THE LEARNING OF MOTOR SKILLS: A DEVELOPMENTAL PERSPECTIVE (EXPERIMENTAL PHASE I).

Gail A. Polkis, Canisius College and Jere D. Gallagher, University of Pittsburgh.

The more complex the learning environment, the more difficult it is for a learner to acquire a skill (Gentile, 1972, 1987). The present research addressed the influence of practice schedule in conjunction with the environmental setting on the learning of motor skills across age. Since young children are more limited than adults in the strategies they use to process information, the manner in which information is presented to young children should vary from that used for older children and adults. Random practice of similar movements has facilitated subsequent retention of movement skills for adults as opposed to practicing the movements separately. These findings have pertained to tasks considered high in complexity. Since the wealth of information inherent in the tasks have been high as has been the task interference, findings may not apply to young children. Twenty 5-, 7-, 11-, and 19-year-old subjects were randomly assigned to a blocked or random group (N= 80). The experiment employed a task considered low in complexity. Subjects were asked to replicate three movement sequences, each consisting of four lights, and were permitted to take as much time as needed to respond. Once the response was initiated, they were to move as fast as possible. The design for the experiment was age (5-, 7-, 11-, 19-years) x group (random/blocked) x trials (4) for acquisition and age x group x sequence for retention. An age x group x phase (2) design was employed to test the contextual interference hypothesis. Separate ANOVA'S were calculated for acquisition, retention and the acquisition-retention comparison with movement time (MT) and error as the dependent variables. A repeated measures chi-square design was employed for both recognition and recall phases of the experiment to compare differences among blocked and random groups. As predicted, 5-year-olds who were presented with blocked presentations of movement sequences during acquisition displayed faster movement times during retention than those presented with random sequences. Since the environmental task demands were relatively low, the 7-year-olds, who are more capable of developing strategies to process information were able to handle the random orders of presentation and perform best. Contextual interference effects were not strongly supported with the data of older children and adults. Findings indicate a need to further investigate the interrelationship of practice schedule and environmental setting. When tasks are relatively simple to perform, type of practice schedule may not be as critical.

SENSORIMOTOR INTEGRATION OF SIMPLE AND CHOICE REACTION
TASK USING THE PSYCHOLOGICAL REFRACTORY PERIOD (PRP)
PARADIGM. M.C.Schutten, J.L. Romack, J.R. Burke,
H.H. Morris. Motor Control Laboratory,
Indiana University, Bloomington, IN 47405.

Previous results from this laboratory suggest that delays in sensorimotor integration in a simple reaction time (SRT) task occur in both the sensory and motor components while delays in the choice tasks (CRT) occur in the sensory component only. The purpose of this study was to identify and verify changes in the sensorimotor integration process for both SRT and CRT in the PRP paradigm. Either SRT or CRT were assessed in 10 college aged males on two consecutive days. During the test sessions for the SRT, subjects performed four blocks of 10 trials of a single-stimulation simple reaction task. This task consisted of a block of supinations and a block of pronations for each hand. For the double-stimulation simple task, the subject was required to respond to a visual stimulus by either supinating or pronating the dominant hand. Following the interstimulus interval (ISI), the subject completed a similar response with the nondominant hand to a second visual stimulus. For the CRT, subjects performed the four blocks of 10 trials of the simple single hand reaction-time task followed by one block of 14 trials with each hand of a single-stimulation choice task. Finally, the subject performed two blocks of 40 trials of a double-stimulation choice-reaction-time task. For the double-stimulation task, the subject was required to respond to a visual stimulus by either supinating or pronating the dominant hand. Following the ISI, the subject completed a similar response with the nondominant hand to a second visual stimulus. The ISI's in both tasks were varied among 50, 100, 200, 400, 800, and 1600 ms. Data collection was performed on line with a microcomputer. Reaction time (RT), premotor time (PMT), and motor time (MT) measured on day 2 were analyzed using an ANOVA model. Initial results for the simple task yielded the classic PRP profile for RT, however contrary to PRP theory, there was a significant ($p < .05$) increase in MT at ISI's > 50 ms. In contrast, the choice task featured an increase in RT extended to the 400 ms ISI. Interestingly, these differences were reflected in the PMT ($p < .05$). From these findings it was concluded that delays in sensorimotor integration in double-stimulation RT tasks occur in either the sensory or motor component, and is a function of task complexity.

A TEST OF THE COMPATIBILITY OF CONTEXTUAL INTERFERENCE AND VARIABILITY OF PRACTICE IN MOTOR LEARNING.

Kellie G. Hall, California Polytechnic State University, Richard A. Magill, Louisiana State University.

Contextual interference and variability of practice are two motor learning phenomenons which have been shown to facilitate skill acquisition. This experiment was the second in a series of experiments based on Wulf and Schmidt (1988), whose purpose was to test the relationship of contextual interference and variability of practice. The present study manipulates two independent variables: practice schedule (random vs. blocked) and relative timing (same phasing tasks vs different phasing tasks). Four groups learned a three segment arm movement with specific timing requirements for each segment. The three task variations presented to each group had either the same relative timing or each had a unique relative timing. Following a 10 minute interval, each group performed two retention tests and two transfer tests, counterbalanced across subjects. The design included a control group which received no acquisition trials but performed the four learning tests. The typical contextual interference effect was found in acquisition as the random groups performed with more error than the blocked groups. On each test, the four experimental groups performed significantly better than the control group. On a retention test which presented tasks with the same relative timing, no differences were found for practice schedule. However, on a retention test which presented tasks with different relative timing the random groups performed better than the blocked. On a novel transfer test that included three speed variations of a novel relative timing task, the random groups performed significantly better than the blocked groups. On a novel transfer test that included several novel relative timing tasks, significant differences were approached but not attained, though the random groups mean error scores were lower than the blocked groups. In testing then, the contextual interference effect was generally found when using tasks with different or novel relative timing characteristics. These results suggest that contextual interference and variability of practice address different learning situations. When the tasks are from different movement classes, different practice schedules influence learning, however, when the task variations are from the same movement class, practice schedule is not an influential factor.

A VISUAL PRETRAINING APPROACH TO OBSERVATIONAL LEARNING: EFFECTS ON COINCIDENT-TIMING SKILL ACQUISITION

Douglas L. Weeks, Motor Behavior Laboratory, Ball State University, Muncie, IN 47306

Modeling a skill to be learned while an individual observes the modeled performance has been shown to be an effective means to enhance skill acquisition for a variety of complex motor tasks with low perceptual demands. However, evidence is lacking as to the efficacy of observational learning techniques with perceptual-motor skills involving a strong perceptual component. One such class of skills are coincident-timing tasks which require visual tracking of an external perceptual stimulus coincident with the production of a motor skill in response to the stimulus. The present investigation was conducted to determine whether modeling the perceptual component of a coincident-timing task while subjects passively viewed presentation of the stimulus (visual pretraining) enhanced skill acquisition in the form of decreased timing error once subjects were transferred to an active performance condition. The motor task was a 60 cm right to left arm movement coincident with the illumination of lights on Bassin Timing Apparatus stimulus runways to subsequently knock over a barrier with the right hand as the final runway light was illuminated. Performance of two groups on the task was compared at 3 different stimulus velocity conditions. One group (visual pretraining group) passively viewed a specific stimulus velocity for 20 trials prior to actively attempting the motor task at that stimulus velocity. The timing performance of the pretrained group was compared to a group which actively performed the task without the benefit of visual pretraining. Results indicated that the visually pretrained group performed with less absolute constant timing error and less variable error at each stimulus velocity suggesting that visual pretraining might enhance formation of a central representation for movement before the representation is actively employed. A parallel goal of the study was to determine the locus of the visual pretraining effect on arm trajectory formation by examining two components of the time to perform the arm movement: time to initiate the response once the light sequence was initiated, and time to perform the movement to the barrier following initiation. Results indicated that the visually pretrained group initiated the movement sooner, but used longer periods of time to traverse the distance to the barrier. Initiating the response sooner enabled the pretrained subjects to have more time available to adjust the arm trajectory during the course of the movement. Thus, visual pretraining may afford a speed-accuracy trade-off advantage in which longer movement times result in lower velocity movements with the outcome being more accurate timing performance in coincident-timing skills.

ALTERNATING ACTUAL AND IMAGERY PRACTICE: PARADIGM CONSIDERATIONS

S. Dee Ellis and Robert M. Kohl, Wayne State University.

Researchers have consistently demonstrated that alternating actual and imagery practice produced retention scores equivalent to (e.g., Oxendine, 1969; Stebbins, 1968) or exceeding (e.g., Egstrom, 1964; McBride & Rothstein, 1979) all previous actual practice. Based on these results numerous researchers/ theorists (e.g., Magill, 1988; Oxendine, 1984) have suggested that alternating actual and imagery practice facilitates motor learning. Since it has also been proposed (Lee & Genoves, 1988) that distributed practice facilitates motor learning, one may argue (c. f., Smyth, 1975) that when actual and imagery practice are alternated imagery practice serves only to distribute actual practice in much the same way as a rest interval. The main purpose of the following experiments was to reexamine the acquisition effects of alternating actual and imagery practice on retention. Control groups, in the following experiments, had imagery practice replaced with rest. In Experiment 1, 100 subjects were randomly assigned to one of five groups (actual practice, imagery practice, alternating actual and imagery practice, alternating actual practice and rest and a control). With respect to each group's practice condition, subjects received eighteen, 30-sec trials with 30-rest intervals on rotor pursuit. After a 10-min interval subjects received a retention test, identical to the actual practice group's acquisition protocol. Analyses of the retention results indicated that the actual practice and the alternating actual and imagery practice groups had equivalent scores, which were significantly higher than the equivalent scores of the imagery practice and alternating actual practice and rest group. All experimental groups yielded significantly higher scores compared to the control. These findings are not predicated by the distribution of practice hypothesis (Smyth, 1975) but are consistent with the notion that alternating actual and imagery practice facilitates motor learning (e.g., Magill, 1988). Since, the retention test was identical to the actual practice protocol, context effects may have bias the retention relative standings in favor of the actual practice group. Kohl and Roenker (1989, 1983) demonstrated that a retention test on the contralateral limb was a less bias measure when comparing actual and imagery practice. Experiment 2 was identical to Experiment 1 (e.g., N=100, five groups) except subjects were transferred to a retention test on the contralateral limb. Analyses of results indicated that the alternating actual and imagery practice group yielded a significantly better score than the equivalent scores of the actual practice and imagery practice groups. Also, all previous mentioned groups produced significantly higher scores than the alternating actual practice and rest group which was significantly better than the control. These results support the notion that alternating actual and imagery practice facilitates motor learning. Also, the pattern of results, from both experiments suggested that context effects may be a factor in response imagery experiments. Since there is converging behavior (Kohl & Roenker, 1989; MacKay, 1981) and physiological (Tucker, Dawson, Torh, & Penland, 1985) evidence consistent with the hypothesis that actual and imagery practice share neuro-mechanisms, the retention gains associated with alternating actual and imagery practice may be similar/related to the retention gains associated with alternating responses with and without knowledge of results (Salmoni, Schmidt & Walter, 1984).

INFLUENCE OF COMPATIBILITY AND MOVEMENT CHARACTERISTICS ON RESPONSE LATENCIES: SUPPORT FOR ABSTRACT RESPONSE CODES

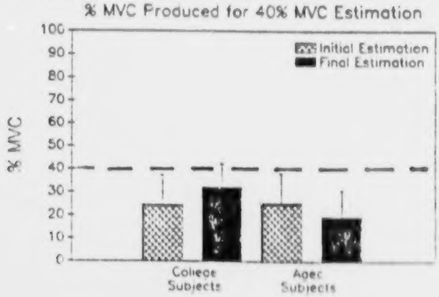
Mark A Guadagnoli, & T. Gilmour Reeve, Motor Behavior Center, Auburn University.

Reaction times (RTs) vary inversely with the degree of stimulus-response (S-R) compatibility. More compatible S-R assignments yield shorter RTs than do less compatible ones. The present study evaluated whether movement characteristics (i.e., movement precision) and S-R compatibility have an interactive effect on RT. Twenty-four subjects performed a 2-choice RT task. For this task, subjects moved the right or left index finger from a start key and to a target key (e.g., moved to the right target with the right index finger) in response to an imperative stimulus, which followed a variable foreperiod (250, 500, 750, or 1000 ms). All subjects participated in 2 experimental sessions. In each session, a different S-R assignment was used. The assignments were direct (e.g., right movement for the right stimulus) or crossed (e.g., right movement for the left stimulus). Within a session, 2 blocks of trials were presented that differed according to the target pairings used. Half of the subjects moved to targets of the same size within each block (one block used large targets and the other used small targets). The other half moved to targets of different sizes within each block (one block used a large target to the left and a small one to the right and the other block used the reverse arrangement). RTs and movement times (MTs) were analyzed in 2 (target pairing) x 2 (target size) x 2 (S-R assignment) x 4 (foreperiod) analyses of variance with repeated measures on the last three factors. The analysis of RT data revealed significant effects for S-R assignment, $\underline{F}(1,22)=61.27$, $\underline{p}>.01$, and foreperiod, $\underline{F}(3,66)=5.88$, $\underline{p}>.01$. The analysis of MT data revealed a significant effect for target size, $\underline{F}(1,22)=4.13$, $\underline{p}>.01$. No interaction between either of the target factors (size or pairing) and S-R assignment was significant. The results were interpreted as evidence that specific movement characteristics are independent of the compatibility effect, suggesting the abstract nature of the response codes used in response-selection processes.

VISUAL FEEDBACK INHIBITS KINESTHETIC LEARNING IN AGED ADULTS.

Gary Kamen, Boston University.

Individuals tend to use visual information to process motor responses, even when reliance on kinesthetic feedback would result in faster responses. Aged adults tend to accentuate this focus on visual information, even in the face of deteriorating visual skills. This experiment was designed to study these two paradoxical observations and determine the joint role of kinesthetic and visual feedback in learning a force reproduction task. Maximal voluntary force of the first dorsal interosseous muscle, an index finger abductor, was tested in the preferred hand of aged (over 65) and college-age subjects (n=20). Each individual was then asked to reproduce 20%, 40%, 60% and 80% of maximal force in a no-feedback condition, with two trials and the order of administration randomized across subjects. Subjects then performed 10 isometric contractions using visual feedback from a video monitor. Each contraction required a slow (4-s) rise to 40% MVC, maintaining 40% MVC for 10 s and a slow, 4-s descent to resting level. Force reproduction at 20%, 40%, 60% and 80% MVC was then re-tested. Of particular interest were the absolute error scores. An ANOVA design incorporating the between-groups effect (Groups) and the two repeated-measures effects (pre-post and force levels) revealed the presence of a significant ($p < .02$) Groups x Pre-post interaction. As seen in the figure from the 40% MVC condition below, while the young adults improved following practice, the older adults were less able to reproduce the required target force. While other explanations are plausible (e.g., fatigue during the training task), these results seem to indicate that older adults place an increasing reliance on visual information.



CHANGES IN KNOWLEDGE STRUCTURE WITH EXPERTISE IN BASEBALL

Sue L. McPherson, Gary V. McCoy, and Mark P. Eby, University of Oklahoma.

Researchers examining the development of expertise in various sport domains note that the level of sophistication of sport knowledge influences response selections during sport performance (e.g., basketball- French & Thomas, 1987; badminton- Housner, 1981;tennis- McPherson & Thomas, 1989). The primary focus of this study was to examine how content and structure of baseball knowledge change with expertise and how this knowledge influences decision-making during a simulated game situation. A secondary focus was to test the applicability of McPherson's (1987) model of protocol structure for the domain of baseball. A pilot study indicated the model of protocol structure was a valid and reliable instrument for examining baseball knowledge. Subjects consisted of 12 male collegiate varsity baseball players (experts) and 12 male college physical education students with no high school or college playing experience (novices). All subjects viewed a half-inning of a taped collegiate baseball game and assumed the role of the fourth batter in that inning. Subjects were instructed to verbalize their thinking or "think aloud" during the film presentation. They were specifically asked to respond between each previous batter (first, second, and third), immediately preceding their time at bat, and between each pitch of their time at bat. Verbal protocols were recorded on cassette and transcribed. Verbal reports were classified using a model of protocol structure developed by McPherson (1987) and modified by the authors for the domain of baseball. Responses were classified and coded as condition, action, or goal concepts. Knowledge content was measured in terms of the frequency of the total number of concepts, the total number of different concepts, and the quality of each concept. Knowledge structure was measured by the frequency of connections between concepts (i.e., any word that connects concepts) and linkage of the concepts (e.g., a goal and an action in one response). Analysis of knowledge content indicated experts, as compared to novices, expressed a greater number of condition and action concepts; made richer and more extensive interpretations of these conditions; and selected higher level (more forceful) actions. Analysis of knowledge structure revealed experts exhibited more connections between concepts and more triple and/or greater linkages. Experts and novices exhibited a similar hierarchical goal structure of the simulated baseball task. Experts, however, exhibited a more complex and sophisticated production system (i.e., condition-action rules) to achieve the goals.

DEVELOPMENTAL DIFFERENCES IN THE VISUAL PERCEPTION OF KINEMATIC FORMS AND THE SCALING OF MUSCULAR FORCE.

Michael G. Lacourse, California State University, Long Beach, and Anne Larimer, California Polytechnic State University, San Luis Obispo.

Modeling is considered one of the most effective means by which individuals learn motor skills. According to Bandura (1977), learning occurs when attention is directed towards the relevant aspects of a model's performance. However, it has not been determined which properties of the movement constitute relevant cues. When observing a model, adults are able to use information from complex kinematic patterns to determine the movement kinetics (Bingham, 1987). It is not known whether this ability is equally as good in children of various ages. The purpose of this investigation was to examine the ability of children to perceptually scale the muscular force produced by a model when observing the model perform a motor skill. Forty-five children (15 from each of three age groups; 6-7,9-10,12-13) observed a videotaped model perform a series of 32 underarm ball tosses to various targets (four ball weights x four target distances x two trials at each combination of distance and weight) and then estimated the force produced during the movement. Estimates of force were made using the psychophysical method of cross-modality matching. The exponent of the psychophysical power law (Stevens, 1957) was then estimated for perceived force, movement velocity, and ball weight for each child and across all children in each age group. The psychophysical exponents across individuals were .034, .032, and .063 for perceived force, .919, .747, and .653 for perceived velocity, and .028, .006, and .061 for perceived ball weight for the 6-7, 9-10, and 12-13 age groups respectively (an exponent of 0.0 indicates an inability to distinguish between stimuli, while an exponent of 1.0 indicates the ability to scale the relative stimulus magnitudes). The mean individual exponents were .053, .055, and .065 for perceived force, .944, .692, and .741 for perceived movement velocity, and .036, .024, and .051 for perceived ball weight for the 6-7, 9-10, and 12-13 age groups respectively. Unlike adults, it appears that children are unable to perceptually scale variations in the magnitude of the force produced by a model, nor are they able to scale the weight of a ball. However they are able to scale the magnitude of the movement velocity. Additionally, the consistancy of the group and mean individual exponents indicates that the magnitude of the exponent is not an artifact of averaging data. Further analyses indicate that the children were quite able to rank-order the magnitudes of force, velocity, and ball weight. This suggests a cognitive strategy in which the visual stimuli from a model are mapped onto an ordinal scale rather than a continuous scale.

MOTOR PERFORMANCE DIFFERENCES BETWEEN MIDDLE EASTERN KUWAITI AND NORTH AMERICAN CHILDREN.

M.L. Heston, University of Northern Iowa; D.L. Gallahue & J.K. Wigglesworth, Indiana University; M. Al Haroun, University of Kuwait; F. Kamal, University of Ottawa.

The purpose of this study was to investigate possible cross cultural differences in motor performance among Middle Eastern children from Kuwait, and North American children from Canada and the United States. Children from these countries were selected because they enjoy relatively equivalent high standards of living, while experiencing identifiable differences in opportunities for motor skill development. The Kuwaiti children received daily physical education and participated in highly organized, government-provided sport clubs. The Canadian children also received daily physical education. The U.S. children, however, received only limited physical education. The Canadian and U.S. children were both less likely to have participated non-school sport programs. In addition, traditional sex-role expectations are substantially stronger in Kuwait than in either Canada or the U.S., which may be reflected in motor performance differences among girls from these countries. The sample consisted of 4-, 6-, 8-, and 10-year-old Canadian (n=179, 86 boys), Kuwaiti (n=240, 120 boys), and U.S. children (n=101, 55 boys). The children performed five motor tasks selected to reflect both movement force and movement control factors: 1) throw for distance (TD); 2) throw for accuracy (TA); 3) kick for distance (KD); 4) standing long jump (SLJ); 5) one foot balance (BAL). The effects of culture (Middle Eastern vs. North American), gender, and age on motor performance were assessed using MANOVA procedures. Significant Wilk's lambda values were found for all three independent variables (p<.01). To locate specific motor performance differences, post-hoc MANOVA, univariate ANOVA, and Tukey tests were conducted. Among boys, 4- and 6-year-old Kuwaitis outperformed their North American peers on the TD, TA, KD and BAL. By age 8, these differences had disappeared. The early superior performance of the Kuwaiti boys may reflect a pattern of accelerated motor development due to either genetic or environmental factors. Among girls, 8 and 10-year-old North Americans performed better on the KD, SLJ and BAL than their Kuwaiti peers. The superior performance of the older North American girls may reflect more lenient sex-role expectations. The Kuwaiti girls, while having access to daily physical education and sport clubs, still face stringent sex-role expectations which may ultimately negate these opportunities for motor skill development. Moreover, with the change of governments in Kuwait, it is possible that children there will experience declines in motor performance as the result of reductions in living standards and government program cuts.

THE USE OF LABELING TO IMPROVE MOVEMENT RECALL INVOLVING LEARNING DISABLED CHILDREN

Marybeth P. Miller, Western Washington University and Jere D. Gallagher, University of Pittsburgh

Labeling movement has been an efficient strategy to reduce developmental performance differences between younger, older children and adults. However, no research has been conducted to determine if labeling movement facilitates recall of learning disabled children. This study investigated the effects of labeling on the recall of movement information for younger and older learning disabled children. Subjects were required to complete six hand actions in a specified order on a movement board. The subjects had to flip a switch, turn a handle, slide a bar, bend a rod, push a lever, and pull a cord. The movement board was interfaced with an Apple Computer. Choice reaction time (RT) movement time (MT), and errors were recorded. Subjects performed 10 acquisition trials with knowledge of results, and three sets of 10 retention trials without knowledge of results. Retention intervals were 5 minutes, seven days, and 3 months. The design for the acquisition phase was a 2 age (7, 11 years) x 2 group (label, no-label) x 2 population (learning disabled, non-learning disabled) x 8 (block of trials) factorial design with repeated measures on the last factor. The design for each retention phase was a 2 age (7, 11 years) x 2 group (label, no-label) x 2 population (learning disabled, non-learning disabled) x 2 (block of trials) factorial design with repeated measures on the last factor. ANOVAS were conducted on the dependent variables of RT, MT, and score . The main prediction for the acquisition and three retention phases was that the difference between the 7-year-old learning disabled label and no-label groups would be greater than all other comparisons within age group and diagnosis. Additionally, 11-year-old learning disabled subjects using labels were expected to perform similarly to 7-year-old non-learning disabled children not using labels. As predicted, 7-year-old learning disabled children using labels demonstrated faster RTs and MTs when compared to learning disabled children not using labels. Results indicated that labeling did not differentially effect 11-year-olds regardless of group or population. Overall, as expected non-learning disabled children outperformed learning disabled children. The major finding was that during later acquisition and early retention, 7-year-old learning disabled children trained to label moved faster when compared to learning disabled children not using labels. Future labeling research needs to compare results of the 7-year-old learning disabled subjects to a 5-year-old non-learning disabled population.

BEST COPY AVAILABLE

KNOWLEDGE BASE AND SPORT SKILL PERFORMANCE Wagner D. Campos and Jere D. Gallagher, University of Pittsburgh

The present study examined the development of soccer knowledge base, motor skill performance and their relationship to children's soccer performance during game play. Two male and two female teams at two different ages (8-10 and 12-14 year-olds) were evaluated during a soccer season on components of soccer knowledge base, motor skill performance, and performance during game play. Subjects were measured on all components of performance at the beginning and end of the season. The design of the study was Age x Sex x Trial. MANOVA's and ANOVA's were calculated where appropriate. As predicted, a developmental trend was indicated. The motor skill components demonstrated the greatest differences between older and younger children. Since males and females had the same previous years of soccer experience, gender differences were not expected. However, the results indicated that males performed better than females in all components of performance. From the survey of experience, the findings suggests that males have a tendency to be more serious about the game. Motor skills were the only components of performance to show significant improvement through the season. These findings suggests that children were acquiring the motor skills to carry out the actions at a faster rate than they were increasing their soccer knowledge base and game play. The overall findings of this experiment suggests that the children were developing a soccer knowledge base in addition to acquiring the motor skills necessary to perform the game. However, the results indicated that the instructional emphasis was on motor skill acquisition rather than on cognitive development. The motor skill components were better indicators of development of soccer expertise. The findings also suggest that if the goal is for children to accomplish higher levels of soccer expertise, there is a necessity for coaches to emphasize soccer knowledge base and integrate to motor skill instruction.

RELATIONSHIPS AMONG SOCIOCULTURAL/EXPERIENTIAL/SOCIAL PSYCHOLOGICAL FACTORS AND MOTOR PROFICIENCY OF PRESCHOOL CHILDREN.

Barbara J. Mead and Patricia A. Beitel, University of Tennessee, Knoxville

The purpose of this study was to identify interrelationships among sociocultural, experiential, and familial factors with the social psychological attributes and motor proficiency of 3- to 5-year-old children. The significance of this study lies in its attempt to simultaneously study relationships among a large constellation of factors known to affect motor development, and to extend knowledge of such associations to the age range at which they may first be manifest. Subjects for this study were 75 children who were enrolled in a university-based preschool motor development enrichment program. Parents of these children completed the Mead-Beitel Demographic Profile of Motor Development which provided the relevant background data. Thirty-one of the children were also tested on the Short Form of the Bruininks-Oseretsky Test of Motor Proficiency. Analyses consisted of Kendall tau rank order correlations, and Wilcoxon and Kruskall-Wallis tests of difference on the data which included rank order and ratio variables. All of the following results were significant ($p < .05$). Representative findings include those associated with the degree to which the child values his/her own motor proficiency, the child's motivation toward "athletic" participation, and the child's level of motor proficiency. There was a positive relationship between the degree to which the child values his/her own motor proficiency and: (a) the degree to which both the father and the mother value it, with the relationship of the father being stronger than that for the mother; (b) the degree of father warmth toward the child; (c) how strongly the father disciplines the child; (d) the level of activity of the child's older siblings; and (e) the amount of time parents, siblings, or others spent helping the child with his/her motor development. Sex differences were found in terms of motivation toward "athletic" participation, with it being more important for girls than for boys to participate in order to: (a) satisfy the mother; (b) satisfy a teacher/coach; or to (c) gain extrinsic rewards. Higher levels of motor proficiency were associated with: (a) greater degrees of mother warmth toward the child; (b) greater degrees of mother acceptance of the changes in the social roles of females in the 1980's; and (c) greater amounts of time parents, siblings, or others spent playing with the child. The findings of this study contribute to our knowledge of the complex array of variables related to and/or affecting motor development and demonstrate the need to continue a line of inquiry which may ultimately enable the formulation of strategies to enhance motor development during childhood.

BEST COPY AVAILABLE

THE PHYSICAL FITNESS AND GROWTH CHARACTERISTICS OF URBAN CHILDREN,

Sarah J. Erbaugh, Wayne State University.

This research investigated the health-related fitness test performance and the physical growth of Black and White children (N = 309) from an urban setting. The mean age of the sample was 7 years 9 months (SD = 12 months). Fitness test items included sit-ups, sit-and-reach, 9-minute run, skinfolds (AAHPERD, 1980), and the modified pull-up (Baumgartner, 1978). The standard set of physical growth measurements included height; weight; biacromial and biiliac diameters; and upper arm, chest, and calf circumferences. Research quetions were: (1) How do fitness data of urban children compare to previously established norms? (2) Are there differences in fitness and growth associated with ethnicity, gender, and age? and (3) Can ethnic differences in fitness test performance be explained by physical growth characteristics? Data were analyzed using descriptive statistics and three factor, ethnicity x gender x age, 2 x 2 x 4, analysis of variance procedures. Major findings were: (1)The urban children performed fitness tests well below the 1980 AAHPERD norms (10th-20th percentile). (2)There were ethnic differences in children's fitness scores on two of the tests. The Black children performed significantly better than theWhite children on the modified pull-up test, and in contrast, the White children were superior to the Black children on the 9-minute run. (3) Ethnic differences also were observed for the seven physical growth characteristics. (4) Results of a follow-up ANCOVA suggested that ethnic differences in modified pull-up performance could be explained by physical growth; however, ethnic differences in cardiovascular endurance as measured by the 9-minute run were not associated with growth. Several implications for teachers, parents and researchers are that local norms should be used to interpret fitness scores of urban children. Fitness test scores of children on strength tests such as the modified pull-up may be influenced by physical growth. Additional research is needed to explain ethnic differences in children's scores on the 9-minute run test.

RESPONSE PREPARATION AND OLDER ADULTS

Dapeng Chen, James H. Cauraugh, James E. Graves, Michael L. Pollock, and Scott H. Leggett, University of Florida.

Are 60-79 year old people able to prepare for an upcoming response? What precued conditions (two fingers on the same hand or different hands) or delays (short or long) produce enhanced reaction times? This study was designed to answer these questions. Forty-eight subjects were administered 310 spatial precuing trials (two- or four-choice reaction time task) before and after a six month aerobic exercise program. Half of the subjects were assigned to an adjacent hand position and half were assigned to a crossed position (Cauraugh, 1990; Reeve & Proctor, 1990). Each subject performed index finger or middle finger keypressing responses. Spatial precued conditions (e.g., hand, finger, neither, or no precue) were presented for variable delays (0, 375, 750, 1,500, or 3,000 ms). The 24 subjects in each of the two hand positions were randomly placed in one of three exercise intensity groups (moderate, high, or control). Choice reaction time performances were analyzed in a Hand Position x Exercise Intensity x Test Session x Trial Block x Delay x Precue (2 x 3 x 2 x 2 x 5 x 4) ANOVA with repeated measures on the last four factors. The results indicated four significant three-way interactions: (a) Precue x Hand Position x Exercise Intensity, (b) Test Session x Precue x Exercise Intensity, (c) Trial Block x Precue x Exercise Intensity, and (d) Delay x Precue x Hand Position. Tukey's honestly significant difference procedure on the Test Session x Precue x Exercise Intensity interaction revealed faster reaction times for precued hand, finger, and neither conditions at test session two (posttest) for both moderate and high exercise intensities. Overall the findings indicate that the response preparation effects of these older adults were similar to the effects found for younger adults.

STROBOSCOPIC ANALYSIS OF THE AXIS OF ROTATION IN THE TENNIS SERVES

Rafael E. Bahamonde, Human Performance Laboratories,
Biomechanics Lab, Ball State University, Muncie, Indiana 47306.

The main factors determining the type of serve in tennis (flat, slice or topspin) are the axis of rotation and the rate of rotation of the ball after impact. In order to determine the exact location of the axis of rotation and the angular velocity of the ball; a study was conducted under laboratory conditions where five members of a men's collegiate team performed four consecutive attempts of the three types of serves. The trajectory of the ball immediately after impact was filmed using stroboscopic photography. A standard 35mm camera and a stroboscope operating at 24,000 flashes per minute were used. This high frequency setting provided a constant source of light which allowed the proper execution of the serves and also prevented the overlapping of multiple images. Photographs for each of the serves were enlarged and the ball markings were digitized. Since the radius of the ball was known, it was possible to calculate the three-dimensional (3D) coordinates of the ball markings by using the equation of a sphere. Once the 3D coordinates were computed, a series of vectors operations were used to calculate the axis of rotation vector and the angular velocity of the ball in 3D. The axis of rotation for the flat serves showed no definite patterns although, in all the flat serves there was some kind of rotation (X = 12.9 rev/s). For the slice serves, the axis of rotation almost coincided with the vertical, with a mean angular velocity of 45.6 rev/s. None of the topspin serves had an axis of rotation which could be defined as the axis of rotation of a perfect topspin (horizontal). The topspin serves had a combination of slice rotation and topspin rotation, with a mean angular velocity of 43.2 rev/s. In conclusion, a flat serve without any rotation seems to be a misnomer since there always some kind of rotation present. A perfect topspin serve in which the axis of rotation was parallel to the horizontal was not found in the study, and probably will be very difficult to execute due to the position in which the racket has to the be in relation to the ball at the moment of impact.

PREDICTION OF OPTIMAL PLYOMETRIC DEPTH JUMP HEIGHT UTILIZING STRENGTH AND PHYSICAL CHARACTERISTICS.

Kevin Quinn & Kathleen M. Knutzen, Western Washington University, Bellingham, WA 98225.

The purpose of this study was to identify specific strength and physical characteristics which could be utilized to predict an individual's optimal depth jump height for plyometrics. Seventeen male and 11 female volunteers (age=23.1±3.5 yrs.; wt.=70.0±9.7kg; ht.= 170.1±9.2cm) performed 2 drop jumps from progressively increasing heights (30,60,90,120,150 cm) until a breakdown in the rebound jump was identified. Subjects jumped onto a force platform and were instructed to go no further than 90 deg. of knee flexion and perform a vertical jump as rapidly as possible. The force platform sample (500 Hz) was analyzed to identify the optimal drop height by comparing the value of the maximum vertical force in the initial stages of the support with the maximum vertical force in the propelling portion of the support phase. The optimal depth jump height was designated as the drop height preceding the height where subjects could not generate a maximum force in propulsion which was at least 50% of the 1st vertical force occurring in the impact stage of landing. Strength and physical characteristics were collected at a second experimental session and included measurements of: weight, vertical jump, and isokinetic strength (90 deg/sec) for hip extension, knee extension, and plantar flexion. All strength and physical characteristics were entered into a stepwise linear regression analysis to assess the accuracy of predicting the optimal depth jump height (cm) determined with the force platform analysis. The results produced a significant regression equation ($R=.68, p \le 0.05$) which was as follows: Depth Jump Drop Height (cm) =2.73 + .077(hip ext.) + .107(knee ext.), (SE=27.3 cm). This study lends moderate support for using physical and strength characteristics to individualize depth jump heights for plyometrics.

A COMPARISON OF THE ADDUCTED VERSUS PARALLEL FOOT STANCE ON THE ENHANCEMENT OF POWER IN JUNIOR HIGH SCHOOL FOOTBALL PLAYERS

Mark W. Maneval, Ted Phillips, Helen Ptak, University of Southern Mississippi and George White, Clemson University

The purpose of this investigation was to compare the adducted (ADD) versus parallel (PRL) foot stance on the enhancement of power (PWR) in the three point blocking stance of junior high school football players (JHFP). Due to the fact that a new genre of football coaches are now experimenting with the ADD vs PRL foot position in an attempt to enhance impetus and isolate the correct muscle selection for initial starting movements in the typical offensive football stance, a study was designed to compare the relative effectiveness of the two foot positions. The subjects of this study ($n = 35$), all young aged ($M=12.78$ yrs.) JHFP were asked to execute three explosive movement shoulder block trials from both the ADD and PRL foot stance positions. The order of stance selection was alternated between subjects to account for the learning effect upon trials. A Dekan Automatic Performance Analyzer Model 741 (APA) was used to record elapsed time for each subject's trial. The APA was activated by the release of a remote starting switch when each subject raised the dominate hand on initial movement. A pressure sensitive pad (PSP) was positioned one yard away from the subject to proximate the typical distance between two opposing players on the line of scrimmage in American football. This distance was held constant for each subject. Upon contact with the PSP, the APA was deactivated and the elapsed time was recorded for three trials from each foot position. The best two trials for the ADD and the PRL were averaged for comparison. PWR was calculated for each subject using the following power formula: $P = FV$. A paired t-test was used to ascertain significant differences between the two stances at the .05 alpha level. The analysis revealed no significant differences ($t(34)=1.00 > .05$) between the two stance types. Therefore, it is suggested, that when coaching young JHFP the method of choice in foot placement within the three point stance should be the one that is both comfortable and natural to the individual athlete.

A GROUND REACTION FORCE MODEL TO ASSESS MECHANICAL AND NEUROMUSCULAR RESPONSE COMPONENTS TO ADDED LOAD DURING DROP LANDINGS

Brian L. Caster and Barry T. Bates, University of Oregon

Accurate assessment of mechanical and neural contributions to movement production is a critical step in gaining a proper understanding of the respective roles that the musculoskeletal and neuromuscular systems play in the control of human movement. Previous studies have identified both mechanical and neuromuscular responses to changes in the mechanical constraints of an activity (1,2). The purpose of this study was to develop an empirically based ground reaction force (GRF) model to describe the increases in impact forces postulated for a subject responding mechanically to added mass at the ankle joint during drop landing. Four subjects performed three conditions (C) of 25 landings from a 60 cm height on each of two test days. Additional masses (1024 and 1800 g) were attached to each ankle joint for C2 and removed for C3 on each test day. Vertical GRF data (500 Hz) for fore- (F1) and rearfoot (F2) impact, the relative minimum (FMIN) between F1 and F2 and respective times of occurrence were used in development of the model and subsequent analysis. A model GRF curve associated with deceleration of the body was defined using mean magnitudes and times of occurrence of F1, F2 and FMIN for C1, all represented as proportions of F1. Impulse values across the intervals of contact to F1, F1 to FMIN and FMIN to F2 were calculated geometrically, assuming a constant rate of force change between critical points. The impulse values were represented as proportions of the total impulse from contact to F2. Touchdown velocity of the foot segment was estimated at 3.29 $m^{*}s^{-1}$, corresponding to an estimated actual drop distance of 55 cm before first toe contact. The impulse necessary to bring the added mass to zero velocity, given by the product of the mass and its velocity at touchdown, was proportioned across the intervals as defined by the model curve. The identified temporal and impulse constraints allowed for calculation of impact forces (F1 and F2) associated with deceleration of the added mass, resulting in a model GRF curve that described the impact of the added mass only and allowed for the partitioning of the observed responses to loading and unloading into mechanical and neuromuscular components. Separate ANOVA analyses were conducted for each subject and mass to initially assess the response strategies. Fourteen of the 32 total comparisons were significant ($p < 0.05$) in the mechanically predicted direction, indicating the presence of both mechanical and neuromuscular response strategies. Following correction of C2 force values based upon the increases predicted by the mechanical model, only four of the 14 mechanical responses remained significant. All of the mechanical responses for F2 were accounted for by the added mass, while four of the nine responses in the mechanically predicted direction for F1 appeared to have a strong neuromuscular component functioning in a non-accommodating manner.

REFERENCES

1) Bates et al. (1988). Proc. Fifth Can. Soc. Biomech. (pp. 40-41). Ottawa.
2) Simpson et al. (1988). Biomechanics XI-B (pp. 701-704). Amsterdam.

FOOT STRIKE MECHANICS IN OLDER SPRINTERS

Nancy Hamilton, University of Northern Iowa

The purpose of this study was to describe lower extremity foot strike mechanics across ages in older sprinters. The subjects for this study were 165 sprinters, male and female, ranging in age from 30 to 90+ years. Subjects were videotaped during 100 meter and 200 meter sprint competition at a national and an international meet. Videotape was digitized to an IBM PC/AT computer and measures of ankle, knee, hip, and shank angle were obtained. Ankle range of motion decreased significantly ($p \leq .05$) with increased age. The decrease in range of motion was found to be due primarily to a decrease in plantarflexion (10% decline) as opposed to dorsiflexion (4% decline). Ankle angle at foot strike was in the midrange of motion (75 - 77 degrees) across age groups. The foot position at foot strike varied with age in spite of the consistent ankle angle. From 30 to 60 years of age the forefoot strikes the ground first or simultaneously with the midfoot. From 60 to 80 years of age foot strike was heel first in approximately 70% of the runners. In 85 and 90+ age runners foot strike occurred in a near flat foot position at least 50% of the time. Examination of lower extremity data revealed that both hip and knee range of motion also decline with age. While the timing of hip flexion and knee flexion/extension in the swing phase remain consistent across ages, maximum hip flexion decreases by 11% and maximum knee flexion decreased by 48%. The changes in knee extension were not significant. At the time of foot strike older runners also tended to have a shank angle favoring heel strike and deceleration, although this difference was not statistically significant. Any foot strike in which the heel or the entire foot makes the initial contact will produce a reaction force in the direction opposite the direction of motion, producing a period of deceleration. From this study it was concluded that such deceleration produced by foot strike position may be a factor in loss of sprint speed with age. It was further concluded that foot strike position may be related to reduced range of motion in the hip, knee, and ankle.

KINEMATIC AND TEMPORAL EFFECTS OF FATIGUE IN THE CONCENTRIC PHASE OF THE SQUAT EXERCISE

S. Evans, J. Weir and L. Wagner, University of Nebraska-Lincoln.

The purpose of this investigation was to examine changes in selected kinematic and temporal variables between nonfatigued and fatigued performance of the concentric phase of the squat exercise. Eight college-aged male subjects volunteered to be filmed while performing a set of squats. The lift was divided into three periods: P1, minimum knee angle to 1.57-rad knee angle; P2, 1.57-rad knee angle to 2.36-rad knee angle; and P3, 2.36-rad knee angle to the end of the lift. ANOVA analyses with repeated measures were utilized to examine changes in temporal factors of the lift. A significant difference ($p < .05$) was noted for P2 between nonfatigued and fatigued lifting. ANOVA analyses with repeated measures were utilized to examine changes in knee angular velocity at 1.57-rad and 2.36-rad and average knee angular velocities for each period. No significant differences ($p > .05$) were detected. Examination of individual graphs indicated marked differences between nonfatigued and fatigued lifting. It is possible that the statistical procedures masked changes due to individual adaptations to fatigue.

244

SPONTANEOUS FRACTURES OF THE HUMERUS DURING PITCHING.

C. Partin, T. Branch, E. Emeterio, M. Sabatelle, and P. Chamberland, Emory University, Atlanta, Georgia.

Fractures of the humerus during pitching are considered rare; there are only 4 reported cases in the literature. The purpose of this paper is to report the recent occurrence of 12 pitchers with spontaneous humeral shaft fractures obtained during pitching. These pitchers came from the over 30 Men's Senior Baseball League which commenced in 1987. Once the twelve pitchers were identified they were interviewed over the phone using a standard questionnaire. Medical x-rays and records were solicited from their physicians. Their average age, height and bodyweight was 36 years, 5 feet 11 inches and 188 pounds. They had pitched an average of 11.4 years with an average layoff of 14 years (7-24 years). Mean time between games pitched was 21 days (3-56). The average number of pitches before fracture was 38 (10-100). Only three of them exercised regularly. Nearly all felt that they had warmed up properly. Nine were starters and 3 relievers. Of the pitchers, 60% had arm pain prior to starting the game and 40% had pain on the previous pitch. Pain was experienced at some point prior to the fracture in 75% of the pitchers. There were 6 fast balls, 4 sliders, 1 curve ball and 1 screwball. Seventy-five percent of the fractures were spiral. Only 2 had a nerve injury, 1 radical and 1 cutaneous. Due to the presence of arm pain prior to fracture and the long layoff before restarting pitching we felt that these fractures were stress fractures brought on by accumulated fatigue damage. The period of build up, after the long period of layoff, was probably insufficient for proper bone remodeling to occur.

A KINETIC AND KINEMATIC COMPARISON OF THE TRADITIONAL AND SUMO STYLE DEADLIFTS.

K. Renee Thiebaud, Texas Woman's University; L. Kay Thigpen, University of Nebraska at Omaha; Sharon M. Tramonte, U.T.M.D. Anderson Cancer Center.

Low back pain and chronic back injury have been a common occurrence in weight lifting. The risk of injury to the low back is increased in the deadlift due to the heavy loads that are lifted. While it is generally accepted that the traditional style deadlift creates a greater force on the lumbo-sacral articulation than the sumo style, the actual forces incurred during the deadlift have not been determined. The purpose of this investigation was to compare the traditional and sumo style deadlifts with respect to lumbo-sacral forces and angular positions and velocities of the relative trunk and knee. Subjects were competitive traditional (n=4) or sumo (n=4) style deadlifters. The subjects were videotaped while performing three lifts at each of three loads (40, 60, & 80% of maximum) with a five minute rest between each lift. Coordinate data were collected using a Targa 16 image capture board for the start, mid-piont, and end of each lift. Joint centers (ankle, knee, hip, shoulder & bar center) were digitized to obtain coordinate data for calculation of the angular positions and velocities of the relative trunk and knee. For each variable, the average of three trials per load was used in the analysis. The resultant muscle force, compression force, and shear force at the lumbo-sacral articulation were also determined using modified equations from Chaffin and Andersson (1984). MANOVA results indicated that the traditional and sumo deadlifts differed with respect to the resultant muscle force, compression force, and angular position of the relative trunk. No differences were found between the two lifting styles for shear force, angular position of the knee, or angular velocities of the relative trunk or knee. Evidence was found to suggest that traditional style deadlifters may be more prone to muscle strain and compression injuries than are sumo style deadlifters. Evidence was also found to suggest that large incremental increases in the weight of the load may increase the risk of muscle, compression, and shear injuries to the lumbo-sacral articulation.

BEST COPY AVAILABLE

COMPARISON OF THE ENERGY COST AND LOWER EXTREMITY MECHANICS OF THREE STAIR-STEPPING MACHINES

C.J. Ebbeling, T.A Foti, J. Hamill, A. Ward, J.M. Rippe, University of Massachusetts

Stepping machines have become a popular form of aerobic exercise in fitness centers. The purpose of the present study was to compare the lower extremity mechanics and energy cost of the LifeStep (LS), StairMaster 6000 (SM6000), and StairMaster 4000 (SM4000) at step rates of 72, 92, and 102 steps/minute. Twelve subjects participated in two testing sessions (1/machine). Each session consisted of three, 5-minute exercise bouts (1/step rate). The order of machine and step rate was randomized. Throughout the exercise bouts, heart rate (HR, bpm) was monitored in all subjects, and oxygen uptake (VO_2, ml/kg/min) was measured in 4 of the subjects. Reflective markers were placed on 7 anatomical landmarks on the left side of the body. A shuttered, high speed video camera operating at 60 Hz was used to videotape the sagittal view of the subject during minutes 3 and 4 of each bout. Five complete step cycles of each step rate-machine condition for each subject were digitized using a Motion Analysis VP110 processor interfaced to a SUN minicomputer. The coordinate data were digitally filtered and joint angles (degrees) were calculated. Repeated measures ANOVA was used to analyze the heart rate and mechanical data.

	LS			SM6000			SM4000		
Step Rate	72	92	102	72	92	102	72	92	102
VO_2	20.3	25.4	30.1	32.1	40.4	46.1	20.1	25.3	32.4
Heart Rate*‡	115.3	128.3	140.7	142.2	157.6	165.5	113.0	124.8	143.0
Ankle Dorsiflex*	25.9	23.9	22.6	23.5	21.6	20.1	25.8	23.8	23.2
Ankle Plantarflex‡	-4.3	-4.6	-6.4	-15.7	-15.2	-14.3	-4.0	-4.9	-4.7
Knee Flexion*‡	93.7	95.9	98.8	89.8	90.9	92.4	78.0	79.2	79.9
Knee Extension	11.1	11.0	11.6	8.6	8.1	8.5	4.2	8.5	11.3
Hip Flexion*	57.0	62.3	67.4	61.0	65.2	72.0	55.6	60.1	65.5
Hip Extension	10.8	14.5	15.6	8.7	12.1	17.1	7.3	14.3	18.3

* $p < 0.05$, significant difference among step rates

‡ $p < 0.05$, significant difference between machines

Systematic changes in VO_2, HR, ankle dorsiflexion, knee flexion, and hip flexion and extension occurred as a function of step rate. HR, ankle plantarflexion, and knee flexion differed significantly among the three machines. On the LS, all subjects exhibited flexion action at all joints while on the SM4000 and SM6000, several subjects experienced hyperextension at the hip and knee. Descriptive data for VO_2 suggests that the energy cost of exercising on the SM6000 is greater compared to the other two machines which appear to be metabolically similar. Biomechanical and physiological differences among stair-stepping machines should be taken into consideration when prescribing an exercise program.

CORRELATION OF WHEELCHAIR RACER'S ANTHROPOMETRIC, CHAIR, AND INTERFACE DIMENSIONS.

Michael MacLeish, Rory Cooper, and Fred Baldini, Biomedical Engineering Lab, California State University, Sacramento.

Optimal wheelchair racing performance is dependent on the proper interface between the individual and his/her race chair. It was hypothesized that the critical wheelchair design parameters and interface position could be determined based upon the user's anthropometric measures through cross correlation. Twelve elite wheelchair racers (two women and ten men) were the subjects of this investigation. Nine individuals had paraplegia and three quadriplegia. Each individual's anthropometric measures, body weight, and chair's weight were recorded. Front and side view photos were taken of each athlete in their chair while sitting upright and in the full down and forward position. Photos were also taken of the chair alone. Through phototometry, chair and position data were retrieved from the photos. The anthropometric, chair, and position measurements were tabulated and correlation analysis was used to determine which parameters were related. Some of the averages collected from the group include:

	Average	Unit	St.Dev.	Samples
Age	31	yrs.	4.26	12
Years disabled	14	yrs.	8.86	12
Years Racing	5	yrs.	2.57	12
Body Weight	143	lbs.	19.41	12
Height	174	cm	10.36	12
Chair Weight	15.4	lbs.	0.97	12
Wheelbase	701	mm	81.33	12
Chair Width	565	mm	57.11	12
Wheel Camber	11	deg.	1.62	12
Power Gear Ratio	0.535		0.038	12
Est. Frontal Area Up	0.827	m·m	0.114	11
Est. Frontal Area Dn	0.642	m·m	0.16	9

Significant correlation (p = 0.05) relationships were found between body weight and the width between wheel tops, hip width, chair width, and chest width or circumference, and rear wheel camber. The shoulder-to-seat angle in the up position was correlated to the vertical distance between the seat and axle. No significant correlations were found relating arm or hand sizes to any position or chair dimension. Body length, head circumference and leg circumferences were also not correlated to chair or position dimensions. Nothing was found significantly correlated to the chair weight or wheelbase. In conclusion, our results indicate that there may be useful anthropometric measures related to wheelchair design. For example, athletes with larger chest diameter preferred and possible performed better with less wheel camber.

STEP LENGTH DIFFERENCES BETWEEN OVERGROUND AND TREADMILL WALKING IN BELOW-KNEE AMPUTEES.

Pamela A. Macfarlane, Northern Illinois University; David H. Nielsen, The University of Iowa.

Treadmill (TM) walking is commonly used in the assessment of normal and impaired gait to facilitate data collection. The purpose of this study was to compare step lengths of below-knee (BK) amputees as they walked either overground (OG) or on a TM at OG self-selected walking velocity (S-SWV). Seven very active traumatic, male BK amputees who were experienced TM walkers were tested one day wearing a conventional prosthetic foot and a second day using a dynamic type of foot. S-SWV and OG step lengths were measured during steady state walking on a 15m long precalibrated segmental walkway. Involved (amputated) and uninvolved (normal) step lengths were recorded during the time walks from heel placements observed on the walkway. TM step lengths were obtained from 16 mm film data recorded while subjects walked at OG S-SWV on a motor-driven treadmill. The mean length of five consecutive steps for each foot was calculated using standard biomechanical techniques. The mode of walking (OG vs TM) affected the step lengths similarly for both types of prosthetic feet allowing the results to summed across foot type. The table shows the means and standard errors for the step lengths and the step length ratio (involved/uninvolved step length) and the results of paired t-tests comparing the modes of walking.

	OVERGROUND	TREADMILL
Involved Step Length (cm)	76.1 (3.3)	68.6 (3.2)*
Uninvolved Step Length (cm)	76.5 (4.0)	70.5 (3.7)*
Step Length Ratio	1.00 (.03)	0.98 (.03)

* = $p < .05$

The subjects took significantly shorter steps with both feet while walking on the TM than OG which would necessitate an increase in the gait cadence to maintain the same speed. The step length ratio (a measure of gait symmetry) was not significantly affected by the mode of testing. The results of this study suggest that when studying subjects with an impaired gait, care should be taken in applying TM gait findings to OG walking conditions.

THE RELATIONSHIP OF PRONATION AND Q-ANGLE IN THE DYNAMIC SETTING

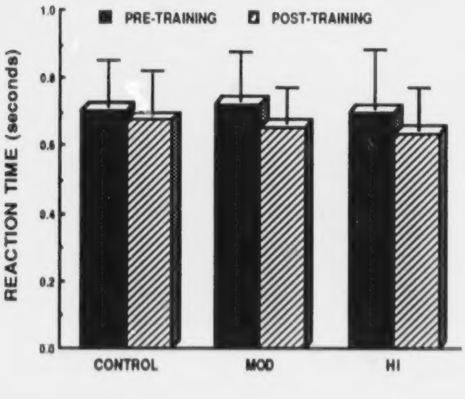
Robert I. Moss, Western Michigan University

Understanding closed kinetic chain relationships is vital in studying motor learning of the lower extremity, evaluation of lower extremity pathology and rehabilitation of the same lower extremity pathology. Movements at the forefoot, subtalar joint, ankle, knee (both tibiofemoral and patellofemoral) and hip all interrelate in order to obtain resultant lower extremity motion when the foot is weight bearing. A crucial relationship in this area is that of pronation with Q-angle in a dynamic environment. Studying "normal" mechanics of the aforementioned relationship will allow a better understanding of this same relationship relative to abnormal mechanics and pathology. Twenty-nine high school age females were biomechanically analyzed using high speed cinematography. They were filmed from the anterior and posterior while running on a treadmill. Dynamic Q-angle and pronation values were obtained and correlated frame by frame. Student's *t* test revealed that subjects with pathology at the patellofemoral joint had Q-angle values significantly smaller than those subjects without pathology when Q-angle was analyzed at the point of maximum pronation. Such results indicate that more study is needed of orthotic devices that control pronation to see if they may also control dynamic Q-angle which may be a predisposing factor in pathology about the knee

EFFECT OF AEROBIC EXERCISE TRAINING ON CHOICE REACTION TIME IN ELDERLY MEN AND WOMEN

James E. Graves, James H. Cauraugh, Michael L. Pollock, Dapeng Chen, Scott H. Leggett, & Diane L. Spitler, University of Florida.

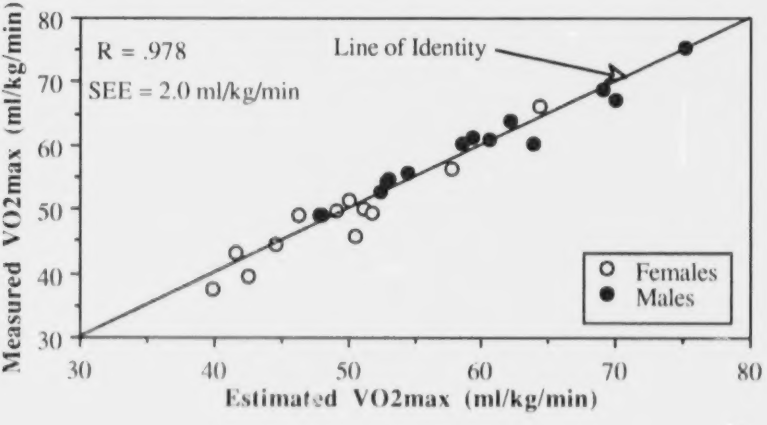
Psychomotor performance declines with age. The purpose of this study was to determine whether aerobic exercise training could improve choice reaction time (RT) in older adults. Eighteen men and 20 women, 60 to 79 years of age, completed a 26 week walking or control (n=11) program. During the first 13 weeks of training, exercise intensity was progressed from 50% of maximum heart rate reserve (HRRmax) to 70% HRRmax. Then subjects were randomly assigned to a moderate intensity (MOD) group (n=17) that maintained intensity at 70% HRRmax or a high intensity (HI) group (n=10) that was progressed to 85% HRRmax for the final 13 weeks. Training frequency was 3 times per week. Training duration was 45 minutes for the MOD and 35 minutes for the HI groups. Prior to and immediately following training subjects completed a choice RT task that involved 310 trials of index or middle finger keypressing under a variety of precued conditions. The mean of the trials was considered the criterion score for choice RT. The MOD and HI groups improved ($p<0.05$) their aerobic power (VO$_2$max) by 16.5 and 23.8%, respectively. The control group did not change. Prior to training choice RT was not related to VO$_2$max (r= -0.27, $p=0.10$). Lack of a significant Group x Time interaction (see figure) indicated that the MOD and HI groups did not change relative to controls. These data indicate that aerobic exercise training does not influence choice RT in healthy older adults.



ESTIMATING VO_{2MAX} FROM HEART RATE AND RUNNING SPEED

N.W. Sherman, A.S. Jackson, & J.M. Pivarnik, Department of Health and Human Performance, University of Houston, Houston, TX 77204-5331

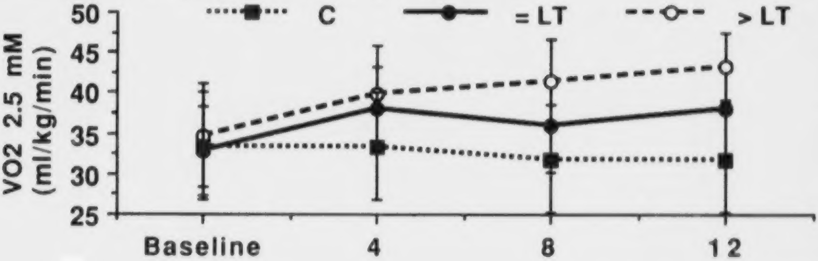
Various models, including the Rockport walk test and a non-exercise model, have been developed to estimate VO_{2max}. These models have been developed using subjects with mean maximum oxygen uptakes of approximately 36 ml/kg/min and tend to underestimate VO_{2max} in subjects with a $VO_{2max} \geq 55$ ml/kg/min. The purpose of this investigation was to quantify the accuracy of estimating VO_{2max} from running speed and heart rate in healthy, well-trained individuals. On the first day of testing, 26 subjects (14 females and 12 males) were administered a maximal Bruce treadmill test. Subject characteristics for the women and men were: VO_{2max} (ml/kg/min) 49.0 ± 7.0 and 61.0 ± 7.0 and age (years) 25.5 ± 4.0 and 27.5 ± 5.0, respectively. Using the ACSM running equation, the subjects were then assigned a running speed below 85% of VO_{2max}. The submaximal exercise bout was 5 min in duration at 0% grade. Exercise heart rate and VO_2 were measured during the final minute of testing. Women and men ran at 6.4 ± 0.9 and 7.9 ± 1.1 mph, i.e., 72 and 67% of VO_{2max}, respectively. Multiple regression was used to develop a model for estimating VO_{2max} from running speed and heart rate. The derived model accurately estimated VO_{2max} (R = .978, SEE = 2.0 ml/kg/min). The accuracy of the model is graphically displayed below. A test of homogeneity of regression slope and intercept revealed that a common regression line could be used for both men and women. These data confirm that VO_{2max} can be accurately estimated with submaximal heart rate response to steady-state running with healthy, trained individuals, and the results can be generalized to men and women.



THE LACTATE THRESHOLD AS A CRITICAL TRAINING INTENSITY

A. Weltman, R. L. Seip, D. Snead, J. Y.Weltman, W. S. Evans, J. D. Veldhuis, & A. D. Rogol. Univ. of Virginia, Charlottesville, VA

We examined the use of the lactate threshold (LT) for exercise prescription. Twenty four sedentary eumenorrheic women (age = 31.3 ± 4.0 yrs, wt = 66.2 ± 7.6 kg, ht = 166.4 ± 5.8 cm) were assessed at baseline [during days 1-3 of the menstrual cycle (MC)] and every 4 MC thereafter (for 1 year) for VO_2 and velocity (V) at LT, at fixed blood lactate concentrations (FBLC) of 2.0, 2.5, and 4.0 mM, and at Peak. Subjects were assigned to control (C, n=7), at LT (= LT, trained 6 days/week at the velocity associated with LT, n=9) or above LT (> LT, trained 3 days/week at the velocity midway between V LT and V Peak and 3 days/week at = LT velocity, n=8) groups. Exercise prescriptions were adjusted after each assessment and each group progressed similarly in weekly mileage. A groups x time ANOVA indicated that the control group did not change. Both training groups showed similar increases in VO_2 and V at LT, FBLC, and Peak from baseline to MC 4 ($P < 0.05$). At MC 8 and 12 only the > LT group continued to increase VO_2 and V ($P < 0.05$). This is shown below for VO_2 2.5 mM.



The present results indicate that at the onset of training, training at or above the LT results in similar improvements in VO_2 and V at LT, FBLC, and Peak. However, for continued improvement some training must be above LT. We conclude that the LT may be a critical intensity for exercise prescription.

Supported in part by NIH grant HD 20465

VALIDITY OF A SELF-REPORT INSTRUMENT FOR MEASURING PHYSICAL ACTIVITY IN THIRD GRADE STUDENTS

Melinda J. Sheffield, University of Houston
James R. Morrow, Jr., University of Houston
Bruce G. Simons-Morton, SPH, UTHSC-Houston
James M. Pivarnik, University of Houston

Recent evidence relates physical activity to cardiovascular disease risk in adulthood. Additionally, attention has been focused on school-age children's cardiovascular fitness levels and physical activity patterns because lifestyle behaviors may be developed in childhood. Large scale studies (e.g., NCYFS) have attempted to determine the amount and types of physical activities performed by children. Much of this attention has focused on physical education programs wherein a major goal has been to develop and maintain activity behaviors and "physical fitness." However, the exact nature of a typical physical education program has not been ascertained. Indeed, it is difficult to determine precisely how much physical activity is performed in physical education programs. A variety of methods (e.g., motion sensors, heart rate monitors, self report, direct observation) have been used to describe the fitness patterns of adults. However, each of these is problematic when used in large scale studies or with elementary age children. It is important that a valid, feasible method to assess children's physical activity patterns be developed so that large scale studies can be accomplished. Physical activity recall has been shown to be valid for adults. If validated for children, activity recall would provide an efficient means for obtaining activity patterns on large groups of youths. The purpose of this research was to determine if third grade students could accurately report their physical activity patterns in physical education class and throughout the day. In particular, the Physical Activity Interview (PAI) was studied to determine its validity for measuring moderate to vigorous physical activity (MVPA) in third grade students. Two criterion measures were used for the self-report instrument: direct observation (DO) and 12 hour heart rate monitoring (HRM). Thirty-one third grade students (20 boys, 11 girls, M age = 8.4) wore heart rate monitors continuously for 12 hours while participating in normal daily activities. Two trained observers used the Children's Physical Activity Rating Form to observe the amount of MVPA the children performed during physical education classes. DO and HRM served as criterion measures for the PAI self-reported MVPA during PE, and HRM alone served as the criterion for PAI total day self-reported MVPA. Pearson correlation coefficients were calculated between PAI min self-reported MVPA and HRM min $\geq$ 140 b/min during PE ($r[29] = -.03$, $p < .86$), PAI self-reported MVPA min and DO MVPA min during PE ($r[29] = -.09$, $p < .60$), DO MVPA min and HRM min $\geq$ 140 b/min during PE ($r[29] = .30$, $p < .10$), and PAI self-reported MVPA min and HRM min $\geq$ 140 b/min during the 12 hour HRM period ($r[29] = .20$, $p < .27$). Mean MVPA min were significantly different ($F[2,30] = 31.76$, $p < .0001$) for HRM ($M = 3.06$), DO ($M = 5.43$), and self-reported min ($M = 12.57$) during PE. The children significantly overestimated their MVPA when compared to DO and HRM. Results indicate the PAI is not a valid instrument for measuring MVPA in third grade children during PE. Additionally, data suggest third grade students receive little MVPA during PE.

THE ECONOMY OF SYNCHRONOUS (SYN) AND ASYNCHRONOUS (ASYN) WHEELCHAIR PROPULSION.

Fred D. Baldini, Rory A. Cooper, and James S. Skinner, Human Performance Lab & Biomedical Engineering Lab, California State University, Sacramento.

Economy is defined as the submaximal steady-state oxygen consumption required to perform a given task. Most frequently this measure has been used in studies of walking and running, however, it is a measure that has potential significance for other forms of locomotion such as wheelchair propulsion. Work by others has raised the possibility that ASYN propulsion may be a more economical form of propulsion compared to the more traditional SYN form. Another issue relates to the appropriateness of useing able bodied individuals as subjects when examining wheelchair exercise. In addition, normal day to day variation in wheelchair economy has not been established. The purpose of this study was to: 1) determine whether ASYN wheelchair propulsion is a more economical form of propulsion; 2) determine if able bodied and wheelchair using individuals respond differently; and 3) to examine day to day variability in economy measures during wheelchair propulsion. This study was divided into 2 phases. The first examined day to day variability in economy during the 2 forms of propulsion in a group of able bodied subjects. The second was used to examine differences between able bodied and wheelchair using individuals during the 2 modes of propulsion. A total of 20 subjects were used in the 2 phases. In phase 1, 10 able bodied males participated in 3 sessions; an orientation session and 2 experimental sessions within a 2 week period. The orientation session was used to inform the subjects of testing procedures, obtain written informed consents, and to habituate the subjects to the wheelchair ergometer. The habituation process consisted of 2-10 min bouts on a wheelchair ergometer at 3.5 mph using the SYN and ASYN modes. During the experimental sessions, each subject performed both modes in a random order for 6 min each at 3.5 mph during which time heart rate, oxygen uptake (economy), pulmonary ventilation, and respiratory exchange ratio data were collected. A 2-factor ANOVA (mode and day) design was used for this phase for each variable. In phase 2, 5 able bodied and 5 wheelchair using subjects with similar injury levels and histories were used as subject. These subjects completed the same tests as described in phase 1 with the addition of biomechanical variables being measured using high speed video. A 3-factor ANOVA (group, mode, and day) design was used for this phase examining the same variables as listed above. Results from both phases revealed that there were no differences in any of the variables measured between the two modes of propulsion, day to day, or between groups. It was concluded that 10 minutes of habituation was sufficient, that there is little day to day variation, that able bodied subject reacted the same under the conditions used in this study, and that ASYN propulsion requires the same oxygen uptake as SYN. Finally, there were no difference in the mechanics of the propulsion used by the two groups, during the two modes, and from day to day.

ANALYSIS OF PHYSICAL FITNESS LEVELS OF INDIVIDUALS WITH MENTALLY HANDICAPPED CONDITIONS IN ILLINOIS, 1980-1990

Dr. Peter Y. Wang, Illinois State University

Based on the AAHPERD's National Youth Fitness Test results, physical education curricula were modified to improve the levels of physical fitness in America's children. Students with mental retardation can and do improve their levels of physical fitness, if given programs of appropriate intensity and duration. It is critical to determine existing levels of ability so as to assure if positive gains are being made. This study was conducted using the data of the past three studies (80, 84, and 88) in this area in Illinois, to determine if improvements of the three mentally retarded groups - mild, moderate, and Down - aged 6 to 21 students on the 5-item physical fitness test - situp, flex arm hang, standing long jump, shuttle run, and 50-yard dash performances. A total of 4,448 subjects were involved in this study. Using these scores, a one-way analysis of variance procedure was employed and 30 comparisons were made between these three years, 1980, 1984, and 1988. Of these 5-item testing, the greatest change was found on the situp test. It showed a marked improvement on four of the six gender and retarded groups ($p<.01$). For flexed arm hand, boys and girls with Down condition improved in 1984 but decreased in 1988 ($p<.01$). In standing long jump, mild boys and Down boys and girls performed poorer in 1988 than the prior two years ($p<.01$). In the shuttle run, 4 of the 6 groups remained at the same level of performance, mild boys ran slower while moderate boys were almost 2 seconds faster ($p<.05$). The only item showing no change was the 50-yard dash, but Down girls in 1988 were the slowest runners ($p<.05$). From these results, the conclusions are: 1) the subjects' abdominal and hip flexor muscles have improved; 2) the special physical education programs need more emphasis on arm strength training to improve the upper body muscles of individuals labeled as mild, moderate, and Down syndrome; 3) running and jumping activities should be increased in the programs; and 4) endurance training (cardiovascular) should be strongly emphasized in their programs, in order to improve the performance levels in all groups in Illinois. Through the last 10 years, many new adapted physical education programs were established. This study will serve as a guide for the revision of adapted physical education programs in Illinois.

DEVELOPMENT AND EVALUATION OF A SYSTEMATIC RUN/WALK PROGRAM FOR MEN WITH MENTAL RETARDATION

Barry Lavay, CSU, Long Beach and Thomas L. McKenzie, San Diego State University

While run/walking fitness programs are easy to administer to the general population, a number of unique factors exist when introducing these programs to individuals with mental retardation. To date, few systematic and individualized self-paced run/walk training studies have been conducted for persons with mental retardation. In this investigation a 14 week run/walk program was implemented with five adult men with mild or moderate mental retardation whose mean age was 35 years. Each man was assigned a physical education major as a running partner. To motivate exercise participation a point system was established so the men could earn daily and weekly privileges. Because of the heterogeneity of the men and the small sample size, a single subject protocol was used to assess the results (Hersen & Barlow, 1976). Analysis of pre-test and post-test scores on the Cooper Twelve Minute Run/Walk Test showed each man increased the number of laps completed. Improvement averaged 12.0%, ranging from 2.5% to 22.5%. The men met or exceeded their distance criteria goals in 23 of the 25 sessions. In addition, in a test for maintenance the men maintained run/walk goals without being accompanied by their running partner. A unique aspect of this study was that the men demonstrated they were able to both set goals and engage in appropriate fitness activities in the absence of extensive supervision. Results of this study concur with previous training investigations and suggest that with proper training and reinforcement techniques, men with mental retardation can engage in appropriate activities to improve their cardiovascular fitness levels.

PHYSICAL EDUCATION FOR THE PRE-SCHOOL DISABLED CHILD: A CLASSROOM TEACHER'S OR A SPECIALIST'S JOB?

Robert M. Hautala, University of Nebraska at Omaha

The effectiveness of two adapted physical education programs, one classroom teacher led and the other specialist led, was investigated. Nineteen students from two state mandated early childhood special education classes in a public school "at risk" program served as subjects. The classes had been matched by age and similarity of disability. Subjects were administered the Test of Gross Motor Development (Ulrich, 1985) early in the school year. One class received a twice weekly physical education program taught by university physical education majors. These teachers used scores from the TGMD to identify areas of specific student need to address in their curriculum. The other class received physical education twice weekly from their classroom teacher with no specialist support, as was typical for this program. Both programs used the Kruger and Kruger (1989) and the Bailey and Burton (1982) texts as resources for activity planning. After a seven month program, all subjects were re-administered the TGMD. Results indicated a 6.67 drop in the mean standard score of the classroom teacher led group and a 20.1 point rise in the mean standard score of the specialist led group. Data analysis, utilizing a 2 x 2 (group x time) repeated measures ANOVA with the pre-test and post-test scores (time) treated as a within subjects factor indicated a significant interaction between the variables [$F(1,17) = 12.20$, $p<0.01$]. The difficulties inherent with assigning physical education classes to classroom teachers will be addressed. Because this type of programming is very common, however, the need exists for further investigation into the effectiveness of a classroom teacher led program when specialist consultation is provided.

SELF-PACED AEROBIC EXERCISE. Pamela J. Cress, David N. Ellis, & Charles R. Spellman, University of Kansas Bureau of Child Research

Young adults with mental retardation generally have low levels of physical fitness, in part due to their dependence on others to initiate and prompt their exercise activity. Previous reports of exercise programs directed toward improving this group's cardiovascular endurance have demonstrated the difficulty of maintaining the pace of their exercise to achieve heart rates (HR) in the target zone for maximum cardiovascular improvement. A study was conducted to determine whether five subjects with moderate retardation could be taught to maintain their heart rates in the target zone while riding a stationary bicycle and wearing a portable heart rate monitor (Exersentry Model EXIIIA) that produces audible signals when pre-set, lower and upper limits are violated. Training sessions were interspersed with 10-minute independent exercise sessions. The lower HR limits for these subjects were gradually increased using a changing criterion design (Hartmann & Hall, 1976). HRs were recorded at 30-second intervals during the independent exercise sessions and the data were plotted on scattergrams for visual analysis. All subjects were eventually able to maintain desired HRs when using the monitors. These results suggest that young adults with moderate retardation can learn to self-pace their aerobic exercise when provided with HR monitors that provide feedback to the user.

Reference:

Hartmann, D. P., & Hall, R. V. (1976). The changing criterion design. _Journal of Applied Behavior Analysis_, _9_, 527-532.

EFFECTS OF INDIVIDUALLY DESIGNED CIRCUIT WEIGHT TRAINING PROGRAMS ON BODY COMPOSITION AND NEUROMUSCULAR PERFORMANCE OF ELDERLY MEN AND WOMEN

Frank M. Powell, Furman University, Michael E. Hawkins, Greenville Athletic Club & Sharon A. Fletcher, Furman University.

Circuit weight training (CWT) has promoted significant gains in body composition and neuromuscular performance for young (Wilmore, 1974) and middle-aged subjects (Gettman, et al., 1978). In this study healthy, physically active, elderly men ($\bar{X}$ age = 68, N = 7) and women ($\bar{X}$ age = 67, N = 4) trained three days per week for 23 weeks ($\bar{X}$ = 47 sessions) with individually designed and frequently supervised CWT programs. Adherence was high (>84%) and there were no injuries resulting from CWT. An evaluative test battery administered five times at approximately 5.5 week intervals revealed the following significant ($p<.05$, df=10) changes: Body weight decreased 1.8 kg ($\underline{t}$=3.45), fat weight decreased 3.3 kg ($\underline{t}$=3.84), percent body fat decreased 3.3% ($\underline{t}$=5.60) and systolic and diastolic BP decreased for men, 16.4 and 12 mmHg respectively ($\underline{t}$=4.32 & 3.92). A 1 kg gain in lean body weight was not significant. Maximum bench press strength increased 15.3 lbs ($\underline{t}$=4.90), situps in one minute increased 4 ($\underline{t}$=2.94), and sit and reach flexibility increased 1.5 in ($\underline{t}$=5.46). Properly designed and supervised CWT was found to be appropriate and beneficial to elderly men and women.

EFFECTS OF MIDLINE CROSSING ON RESPONSE COMPONENTS OF MODERATELY MENTALLY HANDICAPPED ADULTS.

Julie A. Johnston, Paul R. Surburg, Indiana University; B. Eason, University of New Orleans.

There is evidence that mildly mentally handicapped persons manifest a reluctance to cross the body's midline and this inhibition may be related to sensory integration dysfunction (Eason & Surburg; 1990). Data from Ayres Test of Midline Crossing while evaluating the directional component of midline crossing does not contain the appropriate sensitivity to assess temporal components. Measurement of certain temporal components may not only address inhibitory aspects of midline crossing, but may provide insights into certain phases of information processing. The purpose of this study was to determine if moderately mentally handicapped adults (1) would require more information processing time as reflected in a reaction time (RT) component of response task when movements are made in a contralateral fashion and if (2) movement time (MT) to the contralateral side also is slower. Ten moderately mentally handicapped (MoMH) adults (IQ, x = 48.9) and an equal number of non-involved adults participated voluntarily in this study. Dependent variables were measured as follows: a subject in a seated position depressed a micro-switch following a ready signal with switch positioned exactly in front of the sternum, released the switch after the onset of a light stimulus (RT) which was located behind a target button. One light and target button was 35.6 cm directly in front of the subject; two other lights and buttons were 35.6 cm from the micro-switch and 45 degrees to the right or left. Depression of the target button constituted response task completion. The elapsed time from release of the switch until depression of target button constituted movement time (MT). Using a random stratified assignment system, subjects performed nine trials ipsilaterally, nine contralaterally and nine trials along the midline. Three sessions of twenty-seven trials constituted the testing component. A three way ANOVA (intelligence x direction x dominance) was conducted for each dependent variable. For RT significant main effects were found for intelligence and the following interactions: direction x dominance, and direction x dominance x intelligence. Post hoc analyses were as follows: with the dominant hand MoMH subjects' RTs were faster involving ipsilateral movements, and with the nondominant hand contralateral movements were associated with faster RTs than ipsilateral movements. For MT the only significant main effect was intelligence. In conclusion, with MoMH subjects, the inhibitory effect of midline crossing on RT was evident only with the use of the dominant hand; directionality did not affect MT.

THE EFFECT OF STRENGTH TRAINING THE LOWER EXTREMITIES IN WOMEN WITH RHEUMATOID ARTHRITIS

Catherine A. Kennedy, Colorado State University and Cynthia Wiese, Westchester College.

The purpose of this study was to examine the effect of a 12 - week physical training program in women with rheumatoid arthritis (RA), functional classes II or III. Twenty-two women, with a mean age of 51, participated in the study. Participants performed a controlled exercise treatment (45 min. in duration), emphasizing strength training to the muscles of the lower extremities, three times a week for three months. The intensity of the exercise treatment was adjusted with respect to individual threshold to pain and fatigue. Nineteen age-matched healthy, untrained subjects served as the controls with respect to the initial strength measurements. Isometric and isokinetic muscle strength of the right knee extensors were tested on a dynamometer (Cybex II, Lumex Ny) before and after the exercise period. Isometric muscle strength was measured as maximal torque at knee angles of 90, 60, and 30 degrees. Maximal isokinetic muscle strength was determined during knee extension with a pretest constant angular velocity (30, 60, 120, 180, 240, 300, degrees per second (°/s) respectively). Subjects were placed with a hip angle of 90-100 degrees and the lower leg attached to the lever of the dynamometer. Knee extension was performed from 100 degrees of knee flexion to full extension. The strength measurements were adjusted for the weight of the leg below the knee. Four measurements were performed at each angular velocity and the highest value was recorded. Torque and knee angles were recorded on an x-y oscilloscope (Tectronix). Non parametric tests were used (median and range). The Mann-Whitney non parametric test for two independent samples was used to test the significance of the difference between the controls and subjects. The Wilcoxon's non parametric test for the dependent measurements was used to test the significance of differences between pre-training and post-training muscle strength values. The median maximal isometric muscle strength of the knee extensors (measured at a 60 degree flexed knee joint) was 85 Nm before and 118 Nm after the training period, a significant increase of 28% ($p<0.05$). The pre-exercise value was 33% lower ($p<0.05$) than that of the control group. Isokinetic strength measurements, at low angular velocities (30°/s and 60°/s), resulted in a significant increase (19% at 30°/s) of the maximal isokinetic muscle strength; while no significant differences were observed when measuring at high angular velocities (180°/s, 240°/s, 300°/s). Pre-exercise maximal isokinetic muscle strength was significantly lower (about 26%) than that of the control group ($p<0.20$-0.01). Isometric and isokinetic muscle strength of the quadriceps was found to increase markedly after a moderate amount of physical training in the experimental group. It should be noted that these post-exercise increases did not reach the normal values of the control group. It is assumed that the improvements observed in isokinetic strength at low angular velocities reflects the type of training. Limited muscular strength is often found in persons with RA, which is thought to be a result of a low level of physical activity and low cardiorespiratory fitness. The progression of RA and the variation in individual activity patterns may force individuals into muscular inactivity resulting in weakness and wasting of muscles. Specific strength training exercises appear to positively influence this situation.

COMPARISON OF BLOOD LIPID LEVELS IN A DOWN SYNDROME VERSUS NON-DOWN SYNDROME MENTALLY RETARDED POPULATION.

James H. Rimmer, Northern Illinois University; Dave Braddock & Glen Fujiura, University of Illinois at Chicago.

There is very little data on the blood cholesterol levels of adults with Down syndrome (DS). Since a number of biochemical abnormalities have been confirmed in persons with DS, some of which are related to lipid metabolism, the following study compared the serum lipid levels of 31 adults with DS (21 males, $\bar{X}$ age = 35.5 yrs; 10 females, $\bar{X}$ age = 37.0 yrs) to a non-DS mentally retarded population (NDS) (162 males, $\bar{X}$ age = 35.9 yrs; 132 females, $\bar{X}$ age = 38.2 yrs). Fasting blood samples were obtained by venipuncture. Data were analyzed on the Abbott Vision system using standard enzymatic procedures. A two-factor ANOVA (sex X DS) using a regression approach was used to analyze the data. The results of the study found that there were consistent gender differences between groups. The female DS subjects had significantly higher levels of high-density lipoprotein cholesterol (HDL-C) (47.2 vs. 40.4) and lower levels of low-density lipoprotein cholesterol (LDL-C) (114.0 vs. 134.0) than their male DS counterparts ($p<.05$). The ratio of total cholesterol to HDL-C (TC/HDL-C) was also significantly lower in the female DS group (4.25 vs. 5.14) ($p<.05$). This same effect also occurred in the NDS group with the females having significantly higher HDL-C (50.3 vs. 44.6), and lower LDL-C (120.5 vs. 127.7) and TC/HDL-C (4.03 vs. 4.52) than male NDS subjects ($p<.05$). There were no significant gender differences between female and male DS groups on total cholesterol (TC) (192.3 vs. 193.5) or triglycerides (TG) (105.6 vs. 119.3). There were also no significant differences on TC, HDL-C, LDL-C, TC/HDL-C, and TG between the DS and NDS groups. Results of this study suggest that the composition and/or metabolism of lipoproteins is similar in DS and NDS adults with mental retardation, and that the risk for developing coronary heart disease (CHD) associated with abnormal lipid profiles appears to be the same for both groups. However, female DS and NDS subjects did have better lipid profiles than their male counterparts and appear to have a lower incidence of coronary heart disease as a result of higher HDL-C and lower LDL-C levels. Overall, 26% of DS and NDS females had hypercholesterolemia (high blood cholesterol) compared to 43% for the males.

INCLUDING PARENTS IN A SCHOOL-BASED EXERCISE AND NUTRITION PROGRAM FOR LEARNING DISABLED CHILDREN

Chris A. Hopper, Mary Gruber, Kathy Munoz, Susan MacConnie, Humboldt State University

The purpose of this study was to examine the effects of a school-based exercise and nutrition program which included parent participation for disabled children. Children (N=11) in a special day class for learning handicapped received a ten week school based program designed to reduce the amount of saturated fat in the diet and improve aerobic physical fitness. The children's parents were also asked to participate by engaging in specific nutritional and exercise activities at home with their family as a "home team." Family teams received weekly points for completing nutrition activities such as following recipes, setting nutritional goals, distinguishing between everyday and sometimes foods, and completing aerobic exercise activities. Stickers and other rewards were presented contingent upon family participation. Results indicated that the children showed significant reductions in skinfold, number of calories, protein, total fat, saturated fat, cholesterol and percent calories from fat. No significant changes were found in the milerun and knowledge tests. The present study suggests that a combination of school-based and family interventions can assist disabled children in improving physical fitness and nutrition.

THE INFLUENCE OF STRENGTH TRAINING ON MUSCULAR STRENGTH AND KINESTHESIS IN CHILDREN OF VARYING VISUAL ABILITIES

J.C. Ozmun, A.E. Mikesky, and P.R. Surburg, School of Health and Physical Education, Portland State University, Portland, OR 97207; The National Institute for Fitness and Sport, Indianapolis, IN 46202; Indiana University, Bloomington, IN 47405.

Strength training has been hypothesized to have a desensitizing effect on muscle spindles (Häkkinen and Komi, 1983). Muscle spindles serve as primary receptors for the kinesthetic sense. Kinesthesis plays an important role in the motor performance of visually impaired children. The purpose of this investigation was to determine the influence of 8 weeks of strength training on isotonic strength and kinesthetic accuracy in visually impaired (VI) and non-visually impaired (NVI) children. Sixteen VI subjects (6 males, 10 females) and 16 NVI subjects (8 males, 8 females) were randomly assigned to a trained or control group. All subjects (mean age = 10.3 yr.) were of prepubertal status (30 Tanner stage 1, 2 Tanner stage 2). All subjects were pre- and post-tested for isotonic strength and movement reproduction accuracy (kinesthesis). Isotonic strength of the right elbow flexors was determined by a 1 repetition max dumbbell curl. Movement reproduction accuracy without vision was determined using a 25°, 50° and 75° movement with a Lafayette Kinesthesiometer. The trained group performed 3 sets (7-11 repetitions) of isotonic bicep curls 3 times per week for 8 weeks. Planned comparisons for a 2 x 2 (group by test) ANOVA model were conducted for both the VI and NVI groups. Significant isotonic strength gains were exhibited by both the VI trained (28%) and NVI trained (23%) groups following the training period ($p<0.05$). Neither VI nor NVI control groups experienced significant strength gains. There were no significant changes in movement reproduction accuracy for either vision group. These results indicate that while isotonic strength training can increase VI and NVI children's strength level, it does not appear to adversely effect their movement reproduction abilities.

Supported by a grant from the CHAMPS Program, Indiana Sports Corporation, Indianapolis, IN.

EXPERTISE AND TEACHING EFFECTIVENESS WITH MAINSTREAMED AND NON-MAINSTREAMED CHILDREN

Bill Vogler, Hans van der Mars, Paul Darst; Arizona State University; Barbara Cusimano, Oregon State Univ.

The study of expertise in teaching has been a valuable research paradigm for determing variables most associated with effective teaching as one progresses from a novice to an expert teacher. The purpose of this study was to analyze the teaching effectiveness of physical educators with mainstreamed and non-mainstreamed children as a function of developing teacher expertise. Twenty two elementary grade (1-6) teachers were grouped into three categories based on Berliner's (1988) progressive model of teacher expertise. Expertise levels were (a) Novice/Advanced Beginner ($M = 1.7$ years of teaching experience; 0.5 SD; $n = 7$); (b) Competent/Proficient ($M = 3.7$; 0.7 SD; $n = 6$; and (c) Experienced/Expert ($M = 8.8$; 1.3 SD; $n = 8$). Forty four students (1 mainstreamed/1 non mainstreamed from each class) were randomly selected to serve as subjects. Each teacher and student was videotaped for the duration of one class 30 minutes in length. A wireless microphone was used to capture verbal feedback of teachers during class. A standard interval and event recording protocal was used to collect data on the following effective teaching variables: (a) % ALT-PE, (b) % Off-Task, (c) % Positive Feedback, and (d) % Subject Matter Knowledge. It was indicated in the results that there were no progressive trends towards more effective teaching as a function of developing teacher expertise. For example, ALT-PE rates for the mainstreamed students for the three expertise groups were, (a) $M = 21.7\%$, $SD = 8.8$, (b) $M = 30.7\%$, $SD = 6.7\%$, and (c) $M = 25.9\%$, $SD = 11.1\%$ respectively and were not statistically significant, $F = 2.00$ (2,36), $p > .05$. Further, there was no significant interaction between student types (mainstreamed or not) of ALT-PE as a function of teacher expertise, $F = 0.21$ (2,36), $p > .05$. These data indicate that developing teacher expertise does not necessarily translate into more effective teaching for either mainstreamed or non mainstreamed students contrary to what might be expected based on Berliner's (1988) model. Further, our data suggest that mainstreamed students seem to behave no closer to non-mainstreamed students with teachers with more expertise. The results may have important bearing on future placement decisions.

MOTOR SEQUENCING OF LEARNING DISABLED BOYS: MODELING AND VERBAL REHEARSAL STRATEGIES

Ellen M. Kowalski, Adelphi University

The purpose of the study was to examine the effects of model type and verbal rehearsal strategy in relation to motor sequencing of learning disabled (LD) boys. Eighty LD boys, aged 7 and 8 years, were exposed to four experimental conditions in a 2 X 2 (Model Type X Verbal Rehearsal) design. Subjects were randomly assigned to one of four groups: (a) visual-silent model/verbal rehearsal, (b) visual-verbal model/verbal rehearsal, (c) visual-silent model/no verbal rehearsal, and (d) visual-verbal model/no verbal rehearsal. The four groups were statistically equal on measures of age, IQ, behavior, learner modality preference, and motor proficiency. Data collected for experimental analysis were generated by the Motor Sequencing Test (MST) which measured the ability to model seven locomotor tasks in correct order. Two 2 X 2 (Model Type X Verbal Rehearsal) factorial analysis of variance were conducted to determine if significant differences existed between model types on MST scores, and between the use of verbal rehearsal strategy and no verbal rehearsal strategy on MST scores. Statistical analysis revealed that LD boys perform significantly better on the motor sequencing test when trained in verbal rehearsal strategy. However, results indicated no significant difference in motor sequencing under visual-silent and visual-verbal conditions. The results of the study show that training in verbal rehearsal strategy is beneficial in aiding LD children in replicating a sequence of motor tasks. These findings support the assumption that verbal rehearsal strategy serves a memory encoding function. Verbal rehearsal has been shown to be an effective technique in attentional focusing and retentional facilitation. Verbal rehearsal strategies need to be incorporated into teaching all children in a motor environment.

DO AS WE SAY NOT AS WE DO. Walter E. Davis, Kent State University, and Terry L. Rizzo, California State University, San Bernardino.

Teaching students with handicaps in regular physical education class settings with nonhandicapped students is an educational policy supported by Public Law 94-142 and the Regular Education Initiative. The assimilation of students with handicaps into regular physical education class settings will depend upon many factors. One critical factor is the preservice preparation of future teachers. The purpose of this study was to determine the extent to which colleges and universities in the United States (n=293) provided future physical educators academic and practical on-campus experiences in teaching students with handicaps in regular class settings. On-campus programs were assessed because many institutions use this controlled teaching experience to foster positive attitudes and pedagogical competence toward teaching students with handicaps. Data were collected during the 1989-90 academic year. Of the institutions surveyed, 254 (87%) responded to the Adapted Physical Education Program survey (Davis & Rizzo, 1989). A majority (n=221, 87%) of institutions offered a program in adapted physical education and 126 (57%) of those programs indicated they had some type of practicum teaching experience and were sent the second portion of the survey. Of those 126 practicum programs receiving the follow-up survey, 105 (83%) provided specific information about the nature of their practicum programs. Results showed that 58 (55%) institutions provided on-campus practicum teaching experiences. Fifty - six (96%) of those institutions taught the concept of mainstreaming, yet only 17 (29%) occasionally integrated students with handicaps with their nonhandicapped peers and only 3 (5%) actually integrated their classes on a regular basis. The results from this survey suggest that colleges and universities providing adapted physical education on-campus programs concerning the teaching of students with handicaps do not demonstrate to future teachers the educational policy of mainstreaming. Physical educators must be afforded the opportunities to experience the principle of mainstreaming so as to be advocates of this educational policy.

268

EFFECT OF DURATION OF BLINDNESS ON SELECTED ASPECTS OF FITNESS AMONG WOMEN.

Jeanne Wenos, Western Washington University; David Wenos, James Madison University

The purpose of the study was to determine if adult women who have been blind for relatively long (10 + years) or short (1 year or less) durations differ in measures of dynamic balance and percent body fat. It has been reported that infants and children who are blind tend to be less physically active (Flavell, 1973), and have higher percentages of body fat than their sighted peers (Winnick, 1985). If the pattern continues or is replicated in adulthood, both factors may further contribute to increased obesity. Also, because balance underlies every aspect of movement performance it is reasonable to assume that when vision is altered or obscured that balance is deleteriously affected (Shumway-Cook, 1987). In the absence of visual balance cues, kinesthetic and vestibular input continues to provide cues for balance but it is unclear how long it takes to learn to rely upon these cues. Of the seven legally blind women (ages 37-78) who served as subjects, four were blind for a minimum of 10 years, and three had been blind for one year or less at the time of the study. The women participated in an activity program that was conducted twice a week for 45 minutes per session over a four month period. A Valhalla Bioelectrical Impedance sytem was used to measure body composition twice during the four month program. Dynamic balance was measured across 15 20-second trials on a Lafayette stabilometer set at 15 degrees sensitivity. A Lafayette clock/counter and repeat cycle timer also were used to collect the data. Goniometer measurements indicated that each participant was not restricted in her ROM necessary for dynamic balance. The results of an ANOVA demonstrated that pre- and post-study measures yielded no significant difference ($\underline{F}$ (1,7) = 2.33, $p > .05$) in percent body fat among subjects, but the women who were blind for 10+ years had significantly ($\underline{F}$ (1,7) = 164.44, $p < .05$) higher percentages of body fat than those who were blind for one year. No differences existed between groups for measures of dynamic balance ($\underline{F}$ (1,7) = 1.77, $p > .05$). It was concluded that balance was not affected by body composition, nor was it affected by the number of years being blind. It is suggested that further studies be conducted to describe fitness needs of blind adults specific to cohort groups in order to control confounding effects of aging on balance and body composition, and to provide insight to the differences in cue utilization among those who are newly blind and those who have years of experience.

THE RELATIONSHIP AND RELIABILITY OF ISOKINETIC AND ISOMETRIC MEASURES IN MENTALLY RETARDED MEN.

Rory Suomi, Paul R. Surburg, Peter Lecius and Wendy G. Poppy. Department of Kinesiology, Indiana University.

Isokinetic strength devices are frequently used by researchers to obtain data concerning strength capacities of various muscle groups. The variable most often measured isokinetically is peak force (PF), though a recent study (Morrissey,1987), has indicated that total work (TW), may be a more valuable indicator of work function. At present only one study (Suomi, 1989) has investigated the reliability of isometric strength measures on mentally retarded subjects, while no studies involving isokinetic assessment with this population has been published. The purpose of this investigation was to determine the reliability of 2 isokinetic and 2 isometric measures obtained on mentally retarded men and to assess the relationship of these measures. Twenty-two mentally retarded men (I.Q= 58, age = 30.3 yrs), were tested on two days. Day 1 consisted of 3 isokinetic test trials for knee extension (KE) and hip abduction (Hab) performed on a MERAC Systems dynamometer. Each trial consisted of 4 maximal contractions at a speed of 60 /s for KE and 30 /s for Hab. TW was registered as the work produced by the 4 reps and the PF obtained was recorded. Day 2 consisted of 7 isometric trials at 60 for KE and according to the positioning protocol by Kendall (1983) for Hab. Three trials were assessed at 0 /s by the MERAC dynamometer and 4 trials by a physical therapist using a hand-dynamometer (NMMT-Nicholas Manual Muscle Tester). Results yielded high intra-rater reliability coefficients for all measures investigated: TW,KE:r=.96-.97, Hab,r=.97-.98; PF:KE,r=.98-.98, Hab,r=.98-.99; NMMT,KE: r=.96-.97, Hab,r=.97-.98, and MAREC Iso.,KE:r=.95-.98, Hab,r=.93-.95. Strong relationships (Pearson r) were found between TW and PF measures,r=.78-.93. Moderate relationships were found between TW and NMMT,r=.45-.73, TW and MAREC Iso.,r=.46-.61, PF and NMMT,r=.67-.80, and PF and MAREC Iso.,r=.50-.78. In conclusion, the reliability of the isokinetic and isometric measures obtained on the mentally retarded men were high. Whereas the relationship of TW and PF was found to be high, the strength of the relationships between the isokinetic and isometric measures were only fair.

PHYSIOLOGICAL, ANTHROPOMETRIC AND DIETARY PROFILES OF OBESE CHILDREN PARTICIPATING IN A 16-WEEK NUTRITION EDUCATION AND PHYSICAL ACTIVITY PROGRAM.

Lynn A. Darby, Jack Thomas, Younghee Kim, Bowling Green State University; Roberta L. Pohlman, Wright State University

Pediatric obesity has become one of the most prevalent nutritional disorders in the U.S. (Weil, 1977). The purpose of this investigation was to determine the effects of a supervised 16-week (March to July) nutrition education (N-ED) and physical activity (PA) program on 8 obese children, 8-13 years of age. The subjects participated 3 times/wk in 90/min PA and N-ED sessions. Each subject had an assigned goal for weekly walking distance determined using pedometers. N-ED consisted of 30/min sessions given 1/wk. Each 24-hr recall, 1/wk, was reviewed to record all food eaten and portion sizes. Subjects and parents attended N-ED seminars every third week where instructions were provided to modify macronutrient % of intake, to increase fiber intake and to motivate increased daily PA. Anthropometric (ANTHR=body weight (BW), height, body mass index, % body fat (BF), girth and limb circumferences), physiological (PHYSIO=VO2 at 85% of HR_{max}, total test time, HR_{rest}), and dietary (DIET=monthly kcal, PRO, CHO, FAT, and fiber) measures were assessed pre- and post-program. Repeated measures ANOVAs and Tukey's tests ($p \leq .05$) were calculated monthly to determine differences among DIET variables while t-tests were computed to assess differences pre- to post-program in ANTHR and PHYSIO measures. $\bar{X}$ caloric intake for the program was 2530 ± 451 kcal. $\bar{X}$ CHO and fiber intake increased, FAT intake decreased, and PRO intake was unchanged. $\bar{X}$ walking distance was 6.37 miles/day and increased until week 10, then decreased corresponding to the end of school. All subjects were in the 1st percentile for the AAHPERD norms of % BF. Four of the 8 subjects decreased in % BF. VO_2 at 85% (l/min) increased significantly ($p \leq .01$) pre- to post-program, but when expressed as ml/kg/BW did not increase significantly. HR_{rest} significantly decreased pre- to post-program. These results support the tenet that childhood obesity is an issue which must be addressed with multi-faceted approaches.

(Grants support from Bowling Green State University)

AN ASSESSMENT OF A STRESS CHALLENGE PROGRAM FOR ADJUDICATED JUVENILES.

Dale E. DeVoe, Colorado State University

This study was designed to determine if participation in physically and psychologically stressful experiences had any relationship to self concept: specifically, this study examined the relationship of a 26-day stress challenge program to the self concepts of juvenile delinquent male participants. Throughout North America a number of programs for delinquent youth have been established based on the Outward Bound concept. These programs attempt to involve participants in a challenging outdoor education experience. The tasks that the participants are involved with include extended expeditions, rock climbing and rappelling, solo (three days and nights alone with minimal supplies), sailing and rowing, canoeing, group initiative tasks, ropes course, obstacle course, map and compass orienteering, and other related activities. Adventure programming for delinquent youth attempts to modify behavior of the participants. Improvement of peer relations, developing pride in self, developing a new sense of purpose, and breaking the failure pattern are all noteworthy goals of adventure programs. There are several speculations on the self concept changes elicited from adventure programs, however, most research has used relatively small samples of subjects. This study utilized a large number of adjudicated juveniles to determine the relationship between self concept and stress challenge programs. The program which was investigated in this study is modeled after the Outward Bound concept. The source of data for this study were 312 juvenile delinquent male youths between 13-17 years of age. The subjects participated in and completed the 26-day stress challenge program. A quasi experimental pretest-posttest design was used. The measuring instrument used was the Rotter Incomplete Sentences Blank (I.S.B.) (Rotter and Rafferty, 1950). The self concept scale consists of 40 short stems from which the subject constructs complete sentences. Each item received a score of from zero to six: zero for the most well-adjusted response and six for the most maladjusted response. The total for the 40 items was the general self concept score. The higher the score, the poorer was the person's self concept. All tests were administered and scored by the same experienced psychologist familiar with the Rotter scoring system. Subjects were pretested prior to the start of the program and were given the same test at the conclusion of the 26-day stress challenge program. Results of this study indicated that self concept scores improved significantly after participation in the program [$t(311) = 15.37$, $p<.05$] (pretest M=129.3, sd=13.1; posttest M=117.0, sd=10.8). It was found that out of the 312 total participants, 266 (85%) had a positive change in self concept, 41 (13%) had a negative change in self concept, and 5 (2%) had no change in self concept. This investigation demonstrated, for some delinquents, a stress challenge program experience is an effective means of promoting positive change.

BEST COPY AVAILABLE

MOVEMENT PATTERNS USED BY CHILDREN WITH CEREBRAL PALSY WHILE RISING FROM SUPINE TO STANDING.

Boni Boswell, East Carolina University; Nancy Gryder, New Bern, NC

In both physical education and physical therapy, the ability to rise to standing is important in developing independence. Research using the component approach has examined nonhandicapped children, ages 4 to 7 years (Van Sant, 1989) performing this task and established movement pattern categories for each of three body regions: upper extremities (U), axial (A), and lower extremities (L). The purpose of this study was to begin documentation of this rising task as performed by children with spastic cerebral palsy, ages 4 to 7 years, and to examine whether the movement categories developed by Van Sant would be applicable. Van Sant sequenced the categories under each body region as steps progressing to advanced patterns. It was hypothesized that if the categories were applicable, the more involved subjects would perform patterns described earlier in the sequence than the less involved subjects. Subjects (N=9) were identified in regard to degree of involvement as mildly (N=5) or moderately (N=4) involved. Height ranged 38" to 51.75" (X= 43.8") and age ranged 53 months to 94 months (X= 63 months). Subjects were identified by physical therapists and video taped in a biomechanics lab with the camera perpendicular to performance mat to record lateral view. Subjects performed 7 successful trials except two who performed 3 or 5 due to nonconforming behavior. After learning Van Sant's categories, the investigators described in writing the movements in all trials. Agreement was reached to modify two categories developed by Van Sant to more accurately describe the subjects. Using the modified categories, investigators obtained 90% or greater of exact agreement on all three body regions. Two other observers were trained, classified 40 randomly selected trials and obtained 90% or greater of exact agreement on all body regions. Frequency of each pattern as a percentage of trials for all subjects was computed. Results indicated that with modification, the movement patterns of these subjects could be described using the categories developed by Van Sant. Mildly involved subjects' predominant steps were: U -Step 2 (80%) , A -Step 4 (60%), L -Step 2 (80%). Moderately involved subjects' predominant steps were: U -Step 1 (50%), A -Step 2 (75%), and L -Step 2 (75%). Therefore, in two body regions the more involved subjects demonstrated patterns described earlier in the developmental sequence than the less involved subjects. This study marks the beginning of documentation of children with cerebral palsy performing this task.

INTERRATER RELIABILITY OF *RESEARCH QUARTERLY FOR EXERCISE AND SPORT* REVIEWS.

James R. Morrow, Jr., Janet E. Fulton, Molly S. Broskoski, and Jerry R. Thomas. Health and Human Performance, University of Houston, Houston, TX 77204-5331 and Exercise Science and Physical Education, Arizona State University, Tempe, AZ 85287.

The professional success of one's endeavors is often contingent on the quality and quantity of manuscripts published in scientific journals. The *Research Quarterly for Exercise and Sport (RQES)*, the research journal of the American Alliance for Health, Physical Education, Recreation and Dance, has been viewed as a "highly rated" journal, having been published for sixty-one consecutive years. The perceived quality of the *RQES* is based in large part on the peer review process utilized for selection of published manuscripts. A requisite for valid decisions regarding manuscript quality rests in the evaluations that an editor receives from reviewers. The peer review process has been questioned because it depends on decisions which may be viewed as biased. Published reports in psychology, the social sciences, and medical journals indicate that interrater agreement and/or reliability may be questionable. Therefore, our purpose was to determine the interrater agreement (reliability) for manuscripts submitted for review to the *RQES*. Analyses included 240 manuscripts or research notes submitted between 1987 and 1990 where two independent, blind reviews were obtained from individuals deemed to have previously conducted (and published) related work. Only original submissions were used in the analyses (i.e., no revised manuscripts were included). The rating scale used during the period was: (1) accept with optional editing; (2) accept with required changes; (3) unacceptable in its present form; and (4) reject unconditionally. The following methods were used to determine interrater agreement and reliability: (1) percent agreement (%); (2) interclass correlation (r); (3) chi square (χ^2); (4) kappa coefficient (κ); (5) one-way (R_{I1}) and two-way (R_{I2}) intraclass models; and (6) Finn's r (r_F). Ratings obtained are presented in the table below. Rater agreements and reliabilities obtained were: perfect agreement = 39%; $r = .29$ ($p < .01$) ($r = .45$ with Spearman-Brown correction); $\chi^2 = 33.5$ ($df = 9$; $p < .0001$); $\kappa = .10$; $R_{I1} = .44$; $R_{I2} = .44$; and $r_F = .50$. *RQES* ratings are similar to those reported in the literature of other disciplines (i.e., typically below .50). Additionally, *RQES* interrater reliabilities appear to be a function of manuscript classification with those in the social sciences having greater reliability than those in the life sciences. This finding is contrary to results suggested in the literature. Training, experience, and reviewer guidelines are recommended to increase interrater agreement.

Rater B		Rater A 1	Rater A 2	Rater A 3	Rater A 4
	1	1	3	6	2
	2	5	16	13	6
	3	12	13	24	34
	4	4	11	37	53

PREDICTING MAXIMUM STRENGTH WITH ABSOLUTE ENDURANCE, WEIGHT AND GENDER

A. Jackson and D. Wilson, University of North Texas

Baumgartner and Jackson (1990) have suggested a method for assessing maximum strength which uses measures of absolute endurance and controls for the variables gender and weight. Research has documented the relationship between absolute endurance and maximal strength in isometric but not isotonic contractions. The purpose of the present study was to determine if the variables body weight (WT), gender (G) and absolute endurance (AE) would provide an acceptable prediction of maximum strength. The prediction sample (PS) (n=137) included 79 males and 58 females with a mean age of 21.5±4.3 yr and weight of 71.6±16.6 kg. In a counterbalanced order the subjects completed two performance tasks, a 1 RM bench press for maximum strength and a maximum number of consecutive repetitions at submaximal weight load (males=45.5 kg; females=22.7 kg) for AE. The mean 1 RM was 68.9±31.4 kg while the mean AE was 26.7±11.2 reps. The three predictor variables were correlated ($p<.01$) to the 1 RM. A stepwise multiple regression produced a R of .95 (Se=±9.6 kg) with all predictors contributing to the equation ($p<.01$). A cross validation sample (CVS) (n=140, males=62; females=78) were measured on the same variables and used to determine the stability of the regression equation of the PS. The R using the equation of the PS and the data of the CVS was .93 (Se=±9.7 kg). These data indicate isotonic strength can be estimated accurately and consistently from WT, G and AE. The prediction equation in standardized form is 1 RM bench press=.13 WT +.39 AE − .74 G. Thus, these predictors can be used to estimate strength where equipment and time constraints prevent the direct measurement of 1 RM values.

RELATIONSHIPS AMONG VARIOUS OBJECTIVE SWIMMING TESTS AND TWO EXPERT EVALUATIONS OF SKILL IN SWIMMING

Hilda Fronske, Utah State University

The purpose of this study was to find an effective and efficient technique for evaluating swimming strokes for male and female beginning and intermediate swimmers (N = 159-185) at the collegiate level. Seven tests were administered to each swimmer. Strokes were evaluated using four evaluation techniques: time to swim 25 yards, number of strokes used to swim 25 yards, subjective expert ratings, and a checklist based on American Red Cross criteria. The Pearson Product Moment correlation was used to compare the average expert ratings and the checklist scores with each other and with the objective evaluation techniques. The analysis of data revealed significant correlations in the speed strokes between time and both the expert ratings and the checklist scores with each other and with the objective evaluation techniques. The analysis of data revealed significant correlations in the speed strokes between time and both the expert ratings and the checklists [front crawl (-.677, -.561), back crawl (-.559, -.470), butterfly (-.686, -.536), and breaststroke (speed) (-.692, -.464)], and in the resting strokes between the number of strokes and both the expert ratings and the checklists [breaststroke (stroke count) (-.597, -.561), sidestroke (-.609, -.599), and elementary backstroke (-.541, -.639)]. Multiple regression analysis revealed that time to swim 25 yards was the best technique for evaluating the front crawl, back crawl, butterfly, and breaststroke (speed), while the number of strokes used to swim 25 yards was the best technique for evaluating breaststroke (stroke count), sidestroke, and elementary backstroke.

PERFORMANCE CHARACTERISTICS OF ELITE MALE VOLLEYBALL PLAYERS.

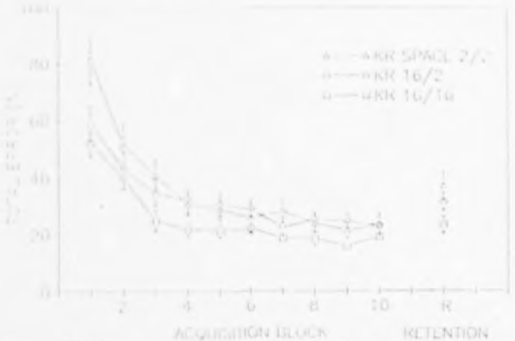
James G. Disch , Rice University and James E. Coleman, U.S.A. Mens' Volleyball Team .

Performance characteristics of elite athletes are interesting to examine for a number of reasons. They can provide a benchmark for other performers to attempt to attain. They can be used to compare performers across sports. Or they can simply be used to provide descriptive data of current performance levels. The purpose of this study is to examine the performance characteristics of elite male volleyball players. The subjects for this study were members of the U.S.A. men's team during January of 1990 (N=18). The data were collected at the U.S.A. training center in San Diego. The variables selected for testing included anthroprometric, strength, endurance, and motor ability tests that are related to volleyball playing capacity. A criterion score named Score100 was assigned to all the players participating in the testing. This score was based on overall playing ability independent of position. For the first phase of the analysis the performance tests were correlated to Score100 to see which of the tests related to player ratings. A multiple correlation was used, but no significance tests were performed because of the small sample size and the descriptive nature of the study. A battery of four tests was found to best predict Score100 with this current group of players (R=.797). The tests were as follows: 3200 meter run, spiking reach (one hand), standing 3 jump, and standing reach (2 hand). This indicates that at the time of testing the better players were in better aerobic shape & taller, with better jumping ability. For the second phase of the analysis, the performance of the starters as a group was compared to the nonstarters. Means and standard deviations were calculated by group. The starters were found to be faster in the 3200 meter run (13.1 minutes to 14.46 minutes) and to have a higher Score100 (69 to 47.5). The other differences were deemed negligible. Inspection of this data provided the following descriptive information. The current U.S.A. players exhibited a high relationship between playing ability and aerobic conditioning , two-hand reach, and jumping ability as measured by the spiking approach (one hand) and standing jumps. The starters were best differentiated from the nonstarters by individual run time and Score100. These statements are specific to the intact group that was tested and do not generalize to other groups. However, they do present descriptive profiles of the group in question.

IS THE "SUMMARY-KR" EFFECT A RELATIVE FREQUENCY OF KR OR SPACING EFFECT ?

C.D. Gable, Shea, C.H., & Wright, D.L. Elouise Beard Smith Human Performance Laboratories, Texas A&M University, College Station, TX 77843-4243.

Summary knowledge of results (KR) involves delaying the presentation of feedback information until the completion of a set of trials. Longer summary lengths during acquisition have been shown to lead to superior retention performance as compared to shorter summaries (Schmidt, Young, Swinnen, & Shapiro, 1990). It is possible that due to the inherently greater lag or space between KR presentations in longer summaries that processes typically associated with relative frequency of KR effects or spacing effects might be contributing to the summary-KR effect. The present experiment sought to investigate this proposal. Sixty subjects learned a force production task requiring 50% of maximum voluntary contraction in one of three experimental KR conditions. One condition was considered a traditional summary-KR condition in which KR was provided after the completion of each block of 16 trials (KR16/16). A second condition also received KR at the end of each block but only on the final two trials (KR16/2). A third condition was identical to the KR16/2 condition except the first 14 trials of each block were not presented. Retention performance was assessed on a block of 16 no-KR trials.



The KR16/16 condition exhibited superior retention performance compared to the KR16/2 condition which in turn demonstrated less error than the KR2/2 condition. These findings question the proposal that the summary-KR effect is merely a version of the relative frequency of KR or spacing effect. It appears that reducing the extent of information contained in the summary, at least to the extent used in the present experiment, is deterimental to retention. However, introducing additional practice trials even though they are unaccompanied by the appropriate KR appears to be beneficial to the learning process.

THE DEVELOPMENT OF CONTEXTUAL DEPENDENCIES DURING MOTOR SKILL ACQUISITION: FURTHER EVIDENCE.

Wright, D.L., & Shea, C.H. Elouise Beard Smith Human Performance Laboratories, Texas A & M University, College Station, TX 77843-4243

Shea and Wright (1990) offered evidence for the development of contextual dependencies during motor skill acquisition. They defined the contextual environment along an intentional and incidental dimension. Intentional stimuli are those explicitly identified as essential to task acquisition. In contrast, incidental cues are those that may become associated with a task. Shea and Wright (1990) demonstrated that subtle changes in the incidental environment at retention from that experienced during acquisition caused subsequent task disruptions. In addition, they revealed that the extent to which these dependencies caused a detriment in performance was mediated by the difficulty of the task being acquired. However, this influence of task difficulty was proposed on the basis of a cross-experiment examination of data. The purpose of the present study was two-fold: (a) an attempt to provide a within-experiment replication of the contextual dependency effect demonstrated by Shea and Wright (1990), and (b) to further examine the mediational effect of task difficulty on this phenomenon. Subjects experienced 108 trials on either three 3-key sequences or three 4-key sequences during acquisition. Retention was assessed on each of the three sequences learned in either a same intentional/same incidental (SI/Sin) context, same intentional/switched incidental (SI/SWIn) context, or no intentional/no incidental (NI/NIn) context. The results indicated the development of strong contextual dependencies for the 4-key but only weak if any for the 3-key sequences. This was consistent with the previous findings of Shea and Wright (1990). Furthermore, the 3-key sequences could be executed successfully in the NI/NIn retention context which was not the case for the 4-key sequences. These findings were consistent with the verbal reports obtained from the subjects indicating very precise knowledge of intentional and incidental stimuli relationships when learning the 3-key sequences but not when learning the more difficult 4-key sequences. These findings in conjunction with those revealed in earlier experiments substantiate the proposed mediational role of task difficulty for the development of contextual dependencies. Moreover, these data also indicate a degree of contextual independence when learning relatively easier motor tasks.

ACQUISITION OF HIERARCHICAL CONTROL AS A FUNCTION OF OBSERVATIONAL PRACTICE

Robert M. Kohl and Charles H Shea, Wayne State and Texas A&M Universities.

In 1966, R.W. Pew conducted an experiment that has since become classic in the motor control/learning literature. Subjects controlled the left/right movement of a cursor displayed on an oscilloscope screen by alternately pressing two response keys. The cursor accelerated to the right when the right key was pressed and to the left when left key was pressed. The subject's goal was to keep the cursor centered on the screen. Over practice, subjects demonstrated a reduction in time between key presses and in position error. During the later trials, subjects corrected for "drift errors" with a rapid rate of responding or they paused to make a discrete correction. Pew (1966) as well as other theorists (e.g., Marteniuk, 1976: Keele, 1981, 1986: Schmidt, 1988) have proposed that these results reflect a corresponding change in control from closed to open loop to hierarchical. The purposes of the following experiments were to replicate Pew's (1966) pattern of results and determine the effects of actual and observational practice on learning a "Pew task". In Experiment 1, 72 subjects were randomly assigned to one of six groups that differed in cursor acceleration (38.6 or 160 cm/sec^2) and practice groups (actual, observational, or control). During the acquisition phase, actual practice subjects performed a "Pew task", while the observation subjects observed twenty 15-sec. trials, with 15-sec rest intervals. The control subjects performed an unrelated activity. After 24 hours, subjects performed one 15-sec retention trail. Experiment 2 was identical to Experiment 1 except another factor that determined target position in terms of sine wave amplitude(1.25 or 5cm) was included (N=120, twelve groups). Both experiments replicated Pew's (1966) pattern of results. All actual practice subjects exhibited an increase in their rate and rhythmicity of responding, and a reduction in position error over acquisition trials. Also, subjects corrected for "drift error" during the latter acquisition trials much like Pew's (1966) subjects. Pew's (1966) interpretation of his data also fits nicely with the present acquisition data in that the pattern of response organization over trials changed from closed to open loop to hierarchical control. The retention tests, from both experiments, demonstrated that the rate and rhythmicity of responding, and the way in which subjects corrected for drift errors, for the observation practice groups were indistinguishable from that of the actual practice groups. However, as the task demands were increased (cursor acceleration and target amplitude), the differences in error between the actual and observation practice groups increased. The retention results from both experiments may indicate that observation practice was sufficient to select a control strategy (i.e., open loop and hierarchical control), but actual practice may have been important to accurately execute the control strategy. The demonstration of the response pattern indicative of open loop and hierarchical control from subjects who only watched during acquisition would seem to pose problems for those who stated (Marteniuk, 1976; Pew, 1966) or implied (Glencross, 1977; Keele, 1986) that the Pew (1966) results support the view that closed loop control is a requisite for developing open loop and /or hierarchical control. The observation practice subjects were never involved in any closed loop control but organized a response pattern reflecting open loop and hierarchical control.

POST-KR DELAY ACTIVITIES THAT DEGRADE SKILL LEARNING.

David Anderson, Douglas Young, William Husak, Motor Behavior Laboratory, California State University, Long Beach; Michael Cohen, Department of Veterans Affairs Medical Center, Long Beach.

Recent research has indicated that the interpolation of activity in the post-KR delay interval can have positive (Young, Cohen, Husak, Anderson, & McArthur, 1990; Wright, 1990), negative (Benedetti & McCullagh, 1987), and no (Lee & Magill, 1983) effect on skill learning. These seemingly contradictory findings may simply reflect the type of information processing afforded by the activity inserted into this interval--hypothesized to be essential for the correction of deficient movements and improvement of subsequent actions (Salmoni, Schmidt, & Walter, 1984). To examine how post-KR delay activities influence skill learning, the performance of three conditions (31 subjects) was contrasted in the acquisition and retention of simple aiming movements to four different target locations (with a constant start position). During acquisition, conditions were provided with either (a) task-related information about the relationships between target locations, (b) non-related information--mathematics problem requiring subtraction, or (c) no interpolated activity in the post-KR delay interval (6 s). Acquisition trials for all conditions were ordered in a blocked practice structure with KR after each movement, while retention trials were presented in a random order without KR. In acquisition, all conditions improved over trials ($p<.05$) with only slight differences between conditions. However, results of the 24-hr retention test indicated that both conditions with interpolated activities had significantly degraded performance in comparison to the no activity condition ($p<.05$). These findings provide further evidence that interpolated activity can degrade learning, and may pose difficulty for explanations of the contextual interference effect (Lee & Magill, 1983; Shea & Zimny, 1983), which predict that these types of activities should enhance motor skill learning.

SPECIFICITY OF PRACTICE IN THE ACQUISITION OF RESPONSE SELECTION SKILL

T. Gilmour Reeve, Mark A. Guadagnoli, & Kenneth H. Steele, Motor Behavior Center, Auburn University.

Response selection skill has been investigated using a four choice spatial-precuing task in which pairs of responses are cued from the index and middle fingers of the two hands. With the spatial-precuing task, a pattern of differential precuing benefits for reaction times (RTs) is obtained with responses being fastest for the pair of responses on the same hand (precued:hand) and slowest for the pair of different fingers on different hands (precued:neither). When subjects practice on the task, the differential pattern is eliminated with all pairs of responses showing equal benefits. The purpose of the present study was to further evaluate the effect of practice on the acquisition of response selection skill. Unlike the previous studies, subjects practiced with only one subset of precues (either the precued:hand or precued:neither) and with only short (0 and 375 ms) or long (1500 and 3000 ms) precuing intervals. Subjects had a total of 192 practice trials. Following the practice sesssion, the 40 subjects (10 per group) were tested with the complete set of 4 precues (i.e., unprecued, precued:hand, precued:finger, and precued:neither) and 5 intervals (i.e., 0, 375, 750, 1500, and 3000 ms). RTs from the test session were analyzed in a 2 X 2 X 4 X 5 (Practice-Precue X Practice-Interval X Precue X Interval) ANOVA, with repeated measures on the last two factors. Results indicated the typical effects of precue, interval and their interaction. Most important, the interactions of Practice-Precue X Precue and Practice-Interval X Interval were significant. The first interaction indicated that practice with the more difficult subset produced the fastest RTs with the effect being greatest for the precued:neither condition. The second interaction showed that practice at the short intervals produced the fastest RTs with this effect being greatest at the short intervals. Taken together, these results demonstrate that acquisition of response selection skill follows the principle of specificity of practice and that practice is most beneficial when it involves the more difficult conditions. Moreover, the lack of other interactions indicates that the effects of practice with precues and precue intervals are independent, suggesting that practice is affecting separate dimensions of response selection.

WOMEN AND THE MEANING OF PHYSICAL RECREATION

Karla A. Henderson and M. Deborah Bialeschki, University of North Carolina-Chapel Hill

The purpose of this exploratory study was to examine the meaning of women's involvement in physical recreation. While much has been written about girls' and women's involvement in competitive athletics, less is known about the everyday physical involvement of women in fitness, recreational sports, and outdoor activities. It was hypothesized that the dearth of literature on the meaning of physical recreation for the "everyday women" may be due to deficient theoretical assumptions and/or operationalizing of variables, inadequate or inappropriate methodology employed, and A failure to discern what constitutes meaning from the perceptions of women themselves. The meaning of the involvement of women in physical recreation was explored using symbolic interaction as an organizin This exploratory study used indepth interviews and a self-administered questionnaire consisting of demographic questions and an "attitude toward physical activity" scale. Descriptive statistics were used in analyzing the self-administered questionnaire. A process of "constant comparison" (Glaser and Strauss, 1967) was used to develop grounded theory and conclusions from the fourteen women who participated in physical recreation regularly who were interviewed. A participant was defined as a woman who undertook some type of organized or planned physical recreation activity for at least an hour a week either in 2-3 short sessions (e.g., aerobics, running, or team sports) or in a physical endeavor that was an important focus once a week (e.g., golf, rock climbing, longer distance biking). The average age of the interviewees was 31 years, over half were single, 71% had no children, the average workweek was 37.5 hours, and all were Caucasian. All except one (93%) said that she looked forward to physical activity and that life was much richer because of physical activity. All but two (86%) felt that physical activity was "vitally important" and that they would arrange their schedules to include physical activity. Several conclusions resulted from the analysis of the indepth interviews: (a) The motivations for participation in physical activity generally focused on finding relaxation and feeling good about oneself (intrinsic) with a lesser focus on getting into shape (extrinsic); (b) While various levels of intensity of participation were mentioned, relaxation seemed to be the most valued outcome of participation; (c) Physical activity was a priority and the women interviewed were generally determined to schedule it even though sometimes inconvenient. Activities done alone (e.g., walking) or those that had greater scheduling flexibility (e.g., aerobics) were the most frequently undertaken activities; (d) Almost all of the women indicated that significant others were supportive of their involvement in physical activity; and (e) Because physical activity was valued, leisure in general was an important value of the women interviewed.

Karla A. Henderson, LSRA, CB #3185 Evergreen, Chapel Hill, NC 27599-3185

SCENIC ROADWAYS AS A MEANS TO RESOURCE PRESERVATION. Steven V. Simpson, Robert A. Robertson, Mary A. Robertson, Iowa State University.

Driving for pleasure is the second most popular recreational activity among adult Americans (The Report of the Presidents Commission: Americans Outdoors; 1987). In 1990, the Federal Highway Administration initiated efforts to accommodate this activity by proposing a national system of scenic roads. One of their justifications is the potential to protect scenic resources (1990 National Scenic Byways Study). This study reviews an established scenic roads program, Wisconsin's Rustic Roads, to determine its contribution to protecting that state's natural, historic, and cultural resources. The case study drew its results from four sources. They were: 1) literature review of legislation, administrative codes, and Rustic Roads files; 2) interviews with Rustic road personnel; 3) "windshield surveys" of all 57 designated roads (assessment of positive and negative attributes, interviews with roadway residents and businesspeople; and 4) telephone survey of people instrumental in the designation of specific roads (motivations behind Rustic Road designation). Although the state offers recommendations, funding, and a relaxation of state standards, all acts contributing to preservation (zoning, reduced mowing, etc.) are initiated by town or county governments. The system contains a diversity of roads. Most have native vegetation (42), tree canopies (41), and views of farms and farmland (31). Forty-five roads have power lines, ten have billboards, and five sand/gravel pits. Using a 5-point Lichert scale, four of the six most important reasons for designation were related to protection of resources: save resources for future generations (3.86); protect historic landscapes (3.83); maintain existing character of the area (3.79), and protect roadside vegetation (3.69). Limiting road improvements/keeping rural area in present condition was deemed by community leaders as the single-most important benefit of the program. Rustic Roads vary dramatically in their level of naturalness. All the roads, however, are maintained at least at a level of natural or rural character that justifies their continuation in the program. This success is, in part, because: 1) local governments choose only roads where people support preservation; 2) most local governments, in managing and maintaining Rustic Roads, take state recommendations seriously; 3) civic pride has resulted from Rustic Road designation; 4) decreased mowing, cessation of herbicide application, and resistance to major road improvements are economically attractive; and 5) tourists attracted to Rustic Roads have been respectful of the designation.

SYMPTOM REPORTING, PERCEIVED HEALTH & LEISURE BEHAVIOR

Michael A. Kanters, Ph.D. and William J. Montelpare, Ph.D. Brock University

The purpose of the present study was to assess the relationship between symptom reporting, perceived physical health, and leisure behavior in a sample of undergraduate students. Several studies have concluded that participation in physical activity leads to a positive perception of health and is primarily evident in the reduction of risk of chronic disease in adults. More specifically, an inverse relationship has been confirmed between participation in regular physical activity and the incidence of coronary heart disease. This relationship has led health promoters/educators to focus on the extrinsic reward of physical activity, such as a reduction in number of cigarettes smoked, changes in consumption of fat, and body image. Few studies have examined the proposition that intrinsically motivated leisure behavior may also lead to greater levels of physical health and well being. Subjects in this study (35 males and 121 females) completed the following: i) a 51 item symptom inventory which recorded the number, frequency of duration and severity of symptoms, ii) the *Leisure Diagnostic Battery*, short form, version B, which assessed an individuals perceived freedom in leisure, iii) an assessment of their freetime (i.e., "when you are free to do whatever you want, what do you do?") indicating the frequency and duration of each activity, and iv) a 10 cm visual analog scale of perceived health ranging from unhealthy to very healthy. The results indicated that females reported more symptoms on average than males, more often and with a greater severity. Males reported more minutes of active leisure and more minutes of passive leisure than females. Average perception of health status was similar across sex. The most frequently reported leisure activities were watching television (70%), socializing (52%) and participating in sports (39%). Freetime behaviors which were participated in most frequently were eating (6.78 days/wk), listening to music (6.68 days/wk), and watching television (5.77 days/wk). Freetime behaviors engaged in for the longest duration were partying (272 min.), going to a bar (260 min.), and going to the movies (166 min.). A rank ordering of both frequency and duration of freetime behavior resulted in active behaviors (exercising-frequency and playing sports-duration) receiving a rank order not higher than nine. Therefore, subjects prefer to engage in passive activities more frequently and for longer periods of time than active activities during their freetime. Multiple regression was used to further analyze the relationship between symptom reporting, measures of active and passive leisure and sex. Results of this analyses showed that the number of symptoms reported was inversely related to the number of days participating in active leisure (p=0.002) and whether the respondent was male (1) or female (2) (p=0.09). The results of this study support the existence of a relationship between the frequency of freely chosen (intrinsically motivated) activity and the number of symptoms reported by subjects. These findings support recent research which suggests that: i) the percent reduction of health risk may not solely depend upon habitual participation of specific intensity in specific types of physical activity, and ii) even modest improvement in physical activity status can be viewed as beneficial. Further research directed at the leisure behavior-physical health relationship should employ more qualitative assessments such as, daily activity journals, interviews, and observations to document leisure behavior and health perceptions.

A PROGRAM SATISFACTION INSTRUMENT

Sandra L. Hupp, Washington State University

Participant self report satisfaction with leisure experiences is a well accepted measure of leisure programs. Participant satisfaction with leisure programs can be used as an evaluation technique for obtaining information on the worth of programs. The purpose of this study was to revise Rossman's Leisure Program Evaluation Form (Rossman, 1982). A jury of 12 experts (practitioners and researchers) was surveyed to determine the content validity of the proposed revision. As a result of suggestions and changes, the pilot instrument included 24 items to measure program satisfaction and six questions to provide additional information about program participation and satisfaction. The form was renamed the Program Activity Satisfaction Scale (PASS). The response choice for satisfaction items was a five point Likert type scale with the anchor points (5) indicating very satisfied and (1) indicating very dissatisfied. This pilot test conducted in community recreation programs resulted in 18 program satisfaction items, reduction of subscales to six, and six additional questions on participation. The subscales autonomy and escape from family were eliminated based on the factor scores Statistical analyses included varimax factor analysis, Cronbach alpha and Pearson Correlation. A second test was implemented in physical activity class programs at Washington State University. These programs are not required for graduation, therefore, students voluntarily choose to participate during what can be considered non-obligated or leisure time. Analysis of the data (2,746 usable questionnaires) resulted in six program satisfaction components: Achievement, Relaxation, Physical Exercise, Environment, Social Enjoyment, and Fun. Overall satisfaction reliability was .87 with subscale reliabilities as follows: Achievement = .84; Physical Exercise = .89; Social Enjoyment = .75; Environment = .71; Relaxation = .71; and Fun .95. Those involved with program planning and implementation may be able to use information gathered from this instrument to determine programs they will want to continue and may be challenged to consider possibilities for additions or alterations to the current program offerings.

PHYSICAL ACTIVITY PREFERENCES AMONG ACTIVE ADULTS

William J. Stone & Steven G. Aldana, Arizona State University.

The purpose of this study was to determine the physical activity preferences of active adults (N=31,663) between 1986 and 1989. Leisure time activity preferences tend to shift with time and are important to both fitness professionals and the fitness industry. Factors currently influencing activity preferences include an aging population and growing exercise epidemiology evidence of the health benefits of moderate to low intensity activity. Data were collected from a health assessment survey of employees and dependents enrolled in the Cigna Health Plan. The study population was demographically similar to groups studied in national surveys conducted by the CDC and others. In addition to standard demographic and health data, the frequency and duration of exercise were also recorded. The results indicated that 61 percent reported regular exercise, while only 24 percent exercised vigorously. Men (65%) were more likely to exercise than women (58%). The top ten activities expressed as the percentage of participants per activity per week include: walking (44.1%), swimming (16.5%), dancing (14.5%), bicycling (13.6%), calisthenics (12.7%), weight lifting (12.2%), aerobics (12.1%), running/jogging (11.1%), basketball (8.6%), and jogging (8.3%). Slow walkers (≥ 20 min/mile), exceeded fast walkers (≤15 min/mile). The number of runners or joggers declined rapidly with age, while walking is the only activity which actually increases with age. Women outnumber men in aerobics participation by a ration of at least 3:1. Comparisons were also made with two large population surveys conducted in 1975 and 1978, and a long running opinion poll. Several significant trends were noted. The percentage of active adults who walk has doubled since 1978, and twice as many women walk for exercise as do men. The number of joggers has declined after peaking in this decade. Although several activities have apparently plateaued during the past decade, weight lifting has increased dramatically. The percentage of participants has tripled, and the increase is much greater among women although men continue to be the majority of participants.

A PRACTICAL INVESTIGATION OF VOLUNTEER SYSTEMS IN RURAL COMMUNITIES.

Ralph Nilson, University of Regina

Volunteerism has always played a significant and fundamental role in rural environments. Rural quality of life has been founded on the traditional values of caring for others, sharing with the less fortunate and cooperating for the common interest. The rationale for this study of volunteer systems in rural areas did not rise from a need to further survey this reputedly viable and enviable state of affairs, but rather from a growing concern that all is not well - that help is needed in rural communities in order to sustain the volunteer sector. The current situation is such that out-migration, fiscal restraint, rail-line abandonment, post office, school and elevator closures, and the loss of medical doctors are making it increasingly difficult for rural communities to fulfill their mandate of providing a quality lifestyle for their citizens. The uncertain economical climate has resulted in a decrease in revenue for voluntary organizations. Therefore, regardless of what type of volunteer work people are involved in - be it community sports, culture and recreation programs, church and school groups, service clubs, health organizations, essential services or policy development agencies - the resources supporting them are decreasing. All the while, communities are relying extensively on volunteers to answer the public demand for community services. As a result, tremendous demand are being made on the volunteers time and resources. From the volunteer's perspective, they are expected to do too much with too little. Using an action research methodology, which used community coordinators for data collection, 1319 questionnaires were returned along with 177 organization profiles from ten rural communities. Analysis and comparisons of the two data sets demonstrated differences in organizational functions and volunteer perceptions on issues of recruitment, recognition, training and funding. Volunteer respondents demonstrated increased time and financial pressures as well as a lack of recruitment, recognition and training opportunities. Results will be discussed relative to recommendations for supporting volunteers in the rural volunteer delivery system.

PERCEIVED FREEDOM IN LEISURE OF PEOPLE WITH ARTHRITIS

Carlton F. Yoshioka and Shelley Smith, Arizona State University.

Arthritis is the most common crippling disease in the United States. More than 37,000,000 people have some form of the disease. While medical researchers (Bonica, 1987; Turk and Stieg, 1987) have emphasized the importance of interdisciplinary communication to arthritis management, only a few (Deyo, Inui, and Overman, 1982; Viney and Westbrook, 1982) have recognized the importance of improving leisure functioning in treating the disease. To date, research has not focused on the relationship of leisure concepts (e.g. freedom and enjoyment) to the psychological effects of a physically limiting disease. This study examined the relationship between perceived freedom in leisure and depression of fifty-nine people with arthritis. Members of six Arthritis Foundation Support groups or clubs in the metro-Phoenix, Arizona, area, completed surveys consisting of the Leisure Diagnostic Battery (LDB) Short From-B (Witt and Ellis, 1987), and the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, and Erbaugh, 1961; Beck, Steer, and Garbin, 1988). Favorite recreation activities had changed due to arthritis for forty-five people, from more active past times such as dancing, sports, or gardening to more passive activities such as reading (22), crafts (15), and walking (14). Standardized alpha reliability coefficients for the LDB and the DBI were .948 and .9054 respectively. The Pearson Product-Moment Correlation coefficient yielded insignificant relationships between level of perceived freedom in leisure and level of depression. Multiple regression analyses revealed that when BDI was the dependent variable, the LDB was a significant independent variable at the .05 level (adjusted R squared of .34). When the LDB was the dependent variable, the absence of an anticipated arthritis related surgery within the next three months, was a significant predictor (adjusted R squared of .30). The LDB mean score for the sample was 3.598. This LDB mean score did not significantly differ from other LDB Short Form-B scores such as those reported for Baptist Church members, stutterers, and professionals working with stutterers (Witt and Ellis, 1989). Participants in this study scored markedly higher than Virginia Polytechnic University Students (mean of 2.3) and lower than people in a Milwaukee Community Leisure Enrichment Program for Disabled Individuals (mean of 3.88) (Witt and Ellis, 1989). The results suggest that it is important for health and recreation professionals to recognize that leisure activity choices of people with arthritis may be an effective means to enjoying an optimum quality life. Study findings suggest that professionals need to evaluate arthritis patients individually, perhaps with instruments such as those administered for this research, in order to help them best revise or implement their own leisure programs.

THE ROLE OF GENDER AND SENSATION-SEEKING IN RECREATION ACTIVITY PREFERENCE

Randy J. Virden and Doug VanOmmeran, Arizona State University

Over the past ten years, gender and sex role differences have increasingly been a topic of research interest in leisure behavior (Bialeschki and Henderson 1988; Duda 1988; Henderson 1990). However, sex and gender role research has been largely overlooked in the outdoor recreation literature over this same time period (Manning 1985; Hendee et. al. 1978). Do men and women engage in outdoor recreation for the same reasons? As an explanation of leisure behavior, arousal theory has support in the leisure behavior literature (Ellis 1973; Csikszentmihalyi 1975; Zuzanek and Mannell 1983). In essence, arousal seeking, also referred to as sensation-seeking, is "a trait defined by the need for varied, novel, and complex sensations and experiences (Zukerman 1979). The present study seeks to investigate the extent to which gender differences in recreation activity preferences are the result of a gender-dependent sensation-seeking orientation. The sample (N=400) utilized in this study was randomly drawn from the on-campus student population at Arizona State University in the spring, 1990. The respondents were mailed a questionnaire assessing their: 1) interest toward participating in 43 individual outdoor recreation activities, 2) generalized sensation seeking orientation, and 3) general demographic characteristics. The recreation activity section was measured on a five-point Likert-type scale ranging from "no interest" to "extremely interested." Sensation seeking was measured with Zuckerman's (1979) forced choice scales that result in a total sensation-seeking index score. After two follow-up mailings, a response rate of 58 percent was achieved. A series of T-test on the 43 recreation activities revealed that male and female students differed in their interest toward 20 of the activities. Female students exhibited greater interest in river tubing, sailing, horseback riding, ice-skating, picnicking, walking for pleasure, sightseeing, sledding, photography and attending outdoor concerts. Male students exhibited greater interest in fishing, hunting, primitive camping, scuba diving, rock climbing, hang-gliding, parachuting, baseball, golfing and football. In order to test the effect that the sensation seeking trait exhibited on these observed gender differences, a partial correlation was performed between gender and each of the 20 significant activities, controlling for sensation seeking. Each of the 20 partial correlations again emerged as significant suggesting that gender is independent of sensation-seeking as an influence on activity interest. These results suggest that gender-based differences do exist in our preference for or interest toward outdoor recreation activities. These differences can not be explained by general sensation-seeking orientation which offers support for a sex role socialization hypothesis (Iso-Ahola 1980) for explaining observed gender differences.

THOUGHT PATTERNS OF BEGINNING AND EXPERIENCED DANCERS DURING BALLET INSTRUCTION. Terry Worthy & Jo Alice Carter, Louisiana State University.

There is a growing interest in the investigation of the thought processes of students as active agents in their own learning. This study was designed to describe and analyze the thoughts of students with varying degrees of dance experience during ballet instruction. Questions focusing the study were: (a) What is the nature of student thought patterns during barre and center practice? (b) How do these thought patterns differ in beginning and experienced students? (c) Do thought sampling techniques, stimulated recall interviews and structured interviews produce similar information regarding student thoughts? Subjects for this study were 23 university students enrolled in a beginning ballet class. Subjects varied in years of previous dance training from 0 to 14 years. Student thoughts were collected 10 times using a thought sampling technique developed by [illegible] and Jensen (1974). Six target students (n = 3 beginners, n = 3 experienced) were selected for more in-depth analysis of their immediate and ongoing thoughts about ballet practice. With videotaped records of two lessons the six selected students participated in stimulated recall interviews, answering questions about their immediate thoughts during different phases of the lesson. During two structured interviews the six subjects answered open-ended questions to elicit the ongoing thoughts during ballet practice. An inductive approach was used to analyze the data from the thought sampling as well as the stimulated recall and structured interviews. Analysis of the thought sampling data indicated four major categories of student thoughts reflecting various attention levels. Categories include thoughts related to (a) sequence or a mechanical aspect of performance (b) evaluation or comparison of performance (c) general progress or class structure and (d) self but unrelated to class. Level of attention was found to be a function of technique complexity rather than skill or experience level. Data collected from stimulated recall interviews were related primarily to self-assessment and evaluation rather than specific thought patterns during performance. The structured interview technique proved more useful in providing data on student thoughts particularly with respect to students psychological status during practice. It was concluded that the investigation of student thinking during ballet practice can be a valuable source of information about the students' perceptions of the teaching/learning process.

ATTRIBUTIONAL ORIENTTIONS OF LOW AND HIGH SELF-ESTEEM COLLEGIATE JAZZ DANCERS FOLLOWING SUCCESS AND FAILURE SITUATIONS

Rinehart, E., Walker, D., & Nelson, K., University of Idaho.

Attributional research has suggested that high self-esteem (HSE) and low self-esteem (LSE) individuals exhibit dissimilar attributional patterns for success and failure. This study compared the attributions of HSE and LSE dancers during success and failure situations. Subjects ($N=32$) were drawn from beginning and intermediate level collegiate jazz dance classes. Self-esteem levels were assessed utilizing the Physical Self-Perception Profile (PSPP). For the purpose of this study, the dance competence subscale of the PSPP was used to categorize dancers into HSE and LSE groups because of its specificity to the dance situation. Subjects' scores on the dance competence subscale were rank-ordered from high to low and divided into three groups of approximately equal sizes. Subjects whose dance competence scores were less than 14($n=11$) were designated as low LSE, and subjects with scores greater than 19($n=10$) were categorized as HSE. After dancers were categorized into self-esteem groups, they were exposed to a success (easy) and failure (difficult) dance combination. The variables that defined difficulty were: (1) *port de bras* difficulty, (2) tempo, (3) level changes, and (4) rhythm pattern changes. Immediately following performance of the combinations, dancers were asked to make attributions concerning performance using the Causal Dimension Scale. The results of ANOVA comparisions indicated that the HSE subjects rated themselves more successful than the LSE subjects under both conditions ($F=8.89$, $p<.01$ for success condition; $F=17.22$, $p<.01$ for failure conditions). HSE dancers perceived success as more controllable than did LSE dancers. However, failure attributions for the two groups were not found to be significantly different. When both groups were combined, locus of causality scores were significantly higher under the failure condition than in the success situation ($F=8.73$, $p<.01$).

EFFECTS OF A NUTRITION INTERVENTION ON FEMALE ENDURANCE ATHLETES WITH REGARD TO CLASIFICATION OF MENSTRUAL STATUS

Dessa K. Bergen-Cico, Syracuse University

Current research in the area of athletic amenorrhea has produced conflicting results, which negate the findings of one another. Furthermore, existing research focuses primarily on athletes ages 18-30, and neglects the prepubescent/ adolescent population.Because of the conflicting views of the existing literature and the lack of research regarding adolescent athletes it was important to synthesize the existing theories and apply them to the adolescent endurance athlete in a longitudinal study so as to establish patterns over time. The focus of this study was to examine the longitudinal differences of cross country runners in somatotype, dietary habits, energy expenditure, estimated basal metabolic rate, menstrual history, and athletic history between three divisions of adolescent cross country runners 1) eumenorrheic subjects,2) subjects who transform from nonmenstruating to menstruating, and 3) nonmenstruating subjects (oligo/amenorrheic and peripubescent subjects) (n=40) (spanning ages 12-18 over the three year course of this study). Body fat was assessed using bioelectrical impedance, diets were assessed using computer analysis with the 1989 RDA guidelines. Statistical significance was assessed using the Analysis of Variance with a $p \leq .05$ level of significance. Preliminary results based on the first two years data analysis have not shown statistically significant differences in somatotype of the athletes. However, results have shown statistically significant differences in the number of calories expended and consumed by the eumenorrheic and nonmenstruating subjects during the first two years. The nonmenstruating subjects were below 69% for their RDA for calcium, magnesium, copper, zinc, pantothenic acid, vitamin E, and calories needed for the first two years. Whereas eumenorrheic subjects were below 69% for their RDA for vitamin E, pantothenic acid, B6 magnesium, and copper prior to the presentation of the educational intervention.These aforementioned results of the first two years have been used to develop education guidelines for healthy food selections and development of balanced activity and dietary habits for adolescent athletes in an effort to minimize the negative effects these poor habits may have on menstrual irregularity. The guidelines were presented to the athletes in the late spring of the second school year, and their dietary habits were reassessed at the beginning of the third school year so as to minimize the effects of other nutritional education factors. The subjects show significant improvements ($p.<.05$) in their overall dietary habits with marked changes in the nutrients they were previously below 69% RDA.

AN ASSESSMENT OF BASIC KNOWLEDGE HELD BY AMERICAN HIGH SCHOOL SENIORS REGARDING HEALTH, FITNESS, AND SPORTS.

William H. Edwards, California State University, Sacramento; Steve Spencer, Western Kentucky University.

An important function of our nation's health and physical education programs is to prepare students to lead healthy, productive lives. Understanding the current state of students' knowledge concerning the basic facts and principles necessary for making wise health decisions is essential in evaluating the effectiveness of current school programs. The purpose of this study was to assess exit competencies held by American high school students regarding basic knowledge of health, fitness, and sports commonly taught in the health and physical education curriculum. More specifically, the objectives were to accurately assess exit competencies relative to (1) body structure and function; (2) consequences of health-related behaviors such as lifestyle and diet; (3) principles of fitness management and exercise; and (4) cultural aspects of sports and sports appreciation. PROCEDURES. A 77-item questionnaire assessing minimal competencies which are reasonable to expect all graduating high school students to possess regarding basic subject matter in the health and physical education curriculum was developed. The survey was administered to 3,126 high school students from 34 high schools across the United States stratified by geographic location, community type, and size. Questionnaires were all administered to intact classes by cooperating on-site teachers following prescribed procedures. RESULTS. Data were analyzed by individual question and by question category across sex, school type, geographic location, attitude regarding physical education, and intention to enter college. There were significant differences between men and women, and between students intending or not intending to enter college. Overall, the percentages of correct responses in each of the categories were 51.8% for knowledge of body structure and function, 46.6% for knowledge of health practices, 56.6% for knowledge of nutrition, 44.2% for knowledge of exercise and fitness principles, and 54.2% for knowledge of cultural aspects of sports. It appears, then, that only about one-half of today's graduating high school seniors have minimal knowledge sufficient to inform and maintain good health behaviors and practices throughout their lifetime.

EFFECTS OF A COMPETENCY-BASED INSTRUCTIONAL PROGRAM ON FIRST-GRADE CHILDREN'S GROSS MOTOR DEVELOPMENT

Arlene A. Ignico, Ball State University

An important component of every preschool and elementary program is gross motor development. Failure to master gross motor skills may have an adverse effect on learning more advanced sport skills (Seefeldt & Haubenstricker, 1982), self-concept and social skill development (Gallahue, 1989; Williams, 1983), and cognitive development (Emmot, 1985). Two common problems currently challenging elementary physical educators are insufficient instructional time and inadequate assessment. The purpose of this study was to examine the effects of a competency-based instructional program taught by upper-level physical education majors on children's gross motor development. Participants were 44 first-grade students (2 intact classes) from 2 elementary schools. Physical education programs were identical at both schools and were taught by the same physical education specialist. The Test of Gross Motor Development (Ulrich, 1985) was used for assessment and instruction. Following training in motor skill analysis and evaluation, 12 university students provided a 10-week competency-based instructional program for the treatment group using the criteria identified in the TGMD. A 2 (gender) X 2 (group) X 2 (test) repeated measures ANOVA produced a significant Group X Test effect. Post-hoc analyses revealed a significant difference between pre and posttest scores for the treatment group only. Gain scores indicated that young girls benefited more than young boys from competency-based instruction. Results suggest that a competency-based assessment and instructional program based on the Test of Gross Motor Development provides valuable benefits for both undergraduate teacher preparation programs and elementary school physical education programs.

INTERACTIVE THOUGHT PROCESSES AS INFLUENCED BY TEACHER ROLE IDENTITY.

Jo A. Carter, Terry Worthy, Amelia Lee and Melinda Solmon, Louisiana State University

Recent research suggests that prospective teachers begin the student teaching experience with definitions of themselves as teachers and beliefs about what teachers should be and do. This study was part of a larger study which investigated the teaching perspectives of a group of student teachers and determined the relative strength of each respondent's image of self as teacher. The framework of this phase of the investigation was developed to respond to the following questions: (a) how does teacher role identity (TRI) strength influence interactive thinking of student teachers, and (b) how do student teachers with different TRI strengths assess themselves as they learn to teach and what is the rationale for the assessment? Subjects for the study were six physical education student teachers at a large southeastern university. Over a 4-month period teachers were videotaped while teaching and participated in 3 stimulated recall interviews. The interviews were audiotaped, transcribed, and coded to evaluate thoughts, concerns, information sources, and levels of awareness. Student teachers were also asked to rate their teaching at monthly intervals and describe the rationale for their rating. Data were examined for differences which may be explained as a function of TRI strength or time spent in student teaching. Results indicated that initially all teachers were aware of student interest, student attitude and personal fears associated with a new teaching situation. Subjects with stronger TRIs were able to progress to concerns about the student and focus on observational cues related to skill performance and student feelings. In contrast the weaker TRIs continued to report concerns about student participation and their own fears of being unsuccessful. While the self ratings varied from teacher to teacher there was no consistent pattern by group nor did the ratings change over the semester. The stronger TRIs however, reported self-adequacy more frequently as the rationale for the rating. The findings support Fuller's (1969) notion that when teachers encounter new situations which require interaction their initial concerns are about themselves and demands of the situation. Further, teachers with stronger TRIs were able to overcome self concerns and report more immediately a concern for student performance.

ASSESSMENT OF PRE-SCHOOL CHILDREN'S PLAYGROUND SKILLS; FOCUS ON BEHAVIORAL MANIFESTATIONS OF MOVEMENT CONFIDENCE.

Michael E. Crawford, University of Missouri-Columbia and Norma S. Griffin, University of Nebraska-Lincoln.

The purpose of this investigation was to determine if behavioral manifestations of non-confidence existed in the play behavior of pre-school children and if such manifestations were related to select measures of physical competence. In previous research (Keogh, Griffin, and Spector, 1981), behavioral manifestations of a Model for Movement Confidence were identified in 4 year old children performing contrived gymnastic like stunts. This study extended previous work by using a natural play setting to search for non-confidence. Secondly, this study sought to identify any key demographic or physical competence variables which would support the development of a personal "profile" of the non-confident child. The problem of this study was to analyze children performing common playground equipment challenge tasks and to contrast and compare any difference observed/ measured between confident and non-confident performers. A convenient gender balanced sample (N=22) of preschoolers were asked to perform a series of six common playground movements while being videotaped. Each also completed a battery of physical fitness/competence measures; arm hang, push-up and sit-up tasks, grip strength measure, and body fat composition measure. The film pool was content analyzed by a panel of experienced observers who rated the level of confidence observed for each child by use of a cued checklist. Observer comments and ratings were content analyzed and statement/categorization reliability across raters computed. A correlation matrix was generated using expert ratings and fitness/competency variables. T-tests were used to compare profiles of confident versus non-confident performers. Descriptive results of this study include the classification of children into three separate levels of movement confidence; confident, non-confident and mixed, with good reliability across raters (r=.8). Behavioral manifestations of non-confidence were identified in the areas of (1) preparatory and performance moves, (2) tempo, and (3) attending behaviors, affirming the 1981 results as generalizable identifiers of non-confidence. Comparison of competency/fitness variables between groups of confident/non-confident subjects yielded no significant differences (p=.001), supporting the notion that there is more to movement confidence variability than just competency differences. The presence of non-confident movement forms among pre-schoolers engaged in common play behaviors suggests practical pedagogical applications and implications for the Model for Movement Confidence.

PERCEIVED COMPETENCE AND MOTIVATIONAL GOALS: CHILDREN'S TASK CHOICE, PERFORMANCE AND STRATEGY USE UNDER PERCEIVED SUCCESS AND FAILURE CONDITIONS.

Diana C. Shakarian, California State University at Fullerton.

Children's perceptions of competence and motivational goal orientation have been shown to be critical determinants of their task choice, performance and persistence under failure, often resulting in the display of "mastery oriented" and "learned helpless" achievement patterns. Applying Dweck's (1984) theoretical framework to the motor domain, this study assessed the effects of perceptions of competence and motivational goal orientation on children's task choice, performance, and strategy use patterns under (perceived) success and failure conditions. Subjects consisted of 127 fourth, fifth and sixth grade males (n=60) and females (n=67) who were randomly assigned to one of four experimental groups (low ability learning goals, low ability performance goals, high ability learning goals, and high ability performance goals). Perceptions of competence were manipulated via ability feedback on a bogus balance pretest while motivational goal orientation was manipulated via instructions which emphasized learning or performance goals. All subjects performed 20 trials on a stabilometer receiving predetermined success and failure feedback. Data analyzed through chi-square and repeated measures ANOVA offered varying support for the predictions made. Consistent with predictions, learning goal groups, regardless of perceived ability (or sex), demonstrated the "mastery oriented" achievement pattern associated with the selection of challenging learning tasks and maintained or improved performance under failure conditions. Similarly, high ability performance goal males and females opted for the challenging to difficult performance task, and also demonstrated the "mastery oriented" achievement pattern relative to task performance. In contrast, low ability performance goal children displayed a tendency to select an easy performance task; however, only low ability performance goal males demonstrated the predicted "learned helpless" response pattern evidenced by inferior task performance under failure conditions. All groups displayed similar and effective strategy use patterns relative to task performance. Findings are discussed relative to theoretical and practical applications with implications for instructional strategies and teacher preparation. Specifically addressed are (1) the similarities and differences emerging in the application of this theoretical construct to academic and motor skills, (2) the cultivation of learning goal environments which facilitate the selection of challenging learning tasks and persistence in the face of failure, and (3) the design of problem solving movement tasks which contribute to the development and application of effective task solution strategies.

BEST COPY AVAILABLE

AN EVALUATION OF POSTURE TRAINING TECHNIQUES USING OBJECTIVE AND SUBJECTIVE MEASURES TO ASSESS THE SAGITTAL CURVATURES

Malcolm Fairweather, Department of Kinesiology, Louisiana State University.

Watson (1983) has indicated that sports participation may enhance the likelihood of postural deviation related to lower back pain. Hanne-Paparo, Aldubi, Dlin, and Goor (1982) found that muscle tightness affecting the spinal column may be present from as early as six years of age. The concern for the Physical Educator lies not only in the establishment of appropriate postural screening measures but also in the development of appropriate postural training techniques. Klafs and Arnheim (1977) suggest flexibility and muscle balancing exercises to restrict the problem of acute lordosis. Seurin (1982) supports this view and recommends exercises for relaxation and body consciousness to challenge the problem of poor posture. The purpose of this study was to compare recognized mobility exercises for the spinal column with an ideokinetic imagery approach. Ideokinetic imagery is understood to promote kinesthetic awareness and subconscious control over the spinal column. Feist (1982) indicates that research is limited with respect to the viability of ideokinetic imagery as a posture training approach. This study assessed fifteen male school pupils age 17 years who were active sportsmen. All subjects had a previous history of lower back pain. Objective assessment of subjects' spinal columns was undertaken using the Wickens - Kiputh method. This method has been validated against a radiographic technique by Hebbelink and Van Mol (1983). They found no significant difference between these techniques in terms of measuring subjects' kyphosis and lordosis angles. Subjective ratings of subjects' sagittal curves were observed using an abbreviated form of the New York Posture Rating Test. Safritt (1986) describes the test, in terms of using a plumb line as a reference, to rate sagittal and frontal deviations. Subjects were randomly assigned to one of three groups (i).Control (ii).Mobility Exercises and (iii).Ideokinetic Imagery. All subjects were photographed under standardized conditions standing upright on a platform with a common background reference. Pre and post-test measures were taken over a three week training period. Group (i) was given no specific instruction. Group (ii) met three times a week for 20 minutes of specific lower back mobility exercises. Group (iii) met three times a week for 20 minutes of deep muscular relaxation and ideokinetic imagery. Analysis of variance found no significant difference between groups with respect to objective measures, $\underline{F}=2.1$, $\underline{p}<.05$. T-test values indicated no significant difference within groups for pre and post-test spinal angles. Intertester and intratester reliability for subjective ratings was supported by correlation values of .96 and .99 respectfully. Subjective ratings highlighted some postural adaptation within the ideokinetic imagery group. This finding was supported by a self-report posthoc questionnaire. Groups (i) & (ii) reported no difference in terms of lower back relief. Group (iii) reported feeling generally more relaxed with no lower back pain and all subjects reported improved sleeping habits. This finding supports the view of Feist (1982) in that ideokinetic imagery may have positive effects in terms of postural development. With respect to the findings in general further longitudinal study which takes into account age and sex factors is suggested.

THE STATUS OF PSYCHOLOGICAL TEST DEVELOPMENT IN THE SPORT AND EXERCISE SCIENCES FROM 1965-1989

Andrew C. Ostrow, West Virginia University

This report summarizes the nature and scope of sport-specific and exercise-specific psychological tests that have been reported in the international scientific literature since the first International Congress of Sport Psychology was held in Rome, Italy, in 1965. An analysis of 28 journals and 9 conference proceedings revealed 175 self-report psychological tests that provided evidence of subject reliability and/or test validity. The data indicated that the most dramatic increase in the publication of sport- and exercise-specific psychological tests occurred from 1985-1989, with the *Journal of Sport & Exercise Psychology* serving as the dominant publication source. The five most popular foci areas were exercise or sport motivation (31 tests), attitudes toward exercise or sport (22 tests), subject movement or sport confidence (19 tests), and subject concerns about body image (15 tests) or sport-related anxiety (14 tests). Data regarding measurement scales employed, construction procedures followed, forms of reliability and validity estimates reported, sampling characteristics, and follow-up psychometric reference support are also reviewed. Recommendations to further advance psychometric test development in the sport and exercise sciences are addressed, including the need for a national clearinghouse to disseminate information on sport- and exercise-specific psychological tests.

RELATIONSHIP BETWEEN PROGRAM GOALS, LEADERSHIP PHILOSOPHY, AND OCCUPATIONAL STRESS AMONG INTERCOLLEGIATE ATHLETIC ADMINISTRATORS. Todd A. Ryska, University of Southern California.

Although sport research has investigated the presence of occupational stress among athletic personnel, few studies have described stress in terms of both intrapersonal and organizational factors operating within the athletic setting. The present investigation sought to: a) determine those factors which influence leadership philosophy and program goal usage among athletic directors and b) discern the relationship between various leadership philosophies and program goals as reported by administrators experiencing relatively low and high job-related stress. NCAA Division I, II, III, and community college athletic directors (n=273) completed the Scale of Athletic Priorities (Chelladurai, Inglis, & Danylchuk, 1984), Styles of Leadership Survey (Hall & Williams, 1986), and Job-Related Tension Index (Kahn, Wolfe, Quinn, & Snoek, 1964). MANOVA indicated that gender and program status influenced the operative goals and leadership approaches utilized by these directors. Correlational analyses revealed that incongruent philosophy-goal patterns were associated with high occupational stress. Directive leaders emphasized Athlete Personal Growth ($p<.05$) and Strategic leaders promoted Entertainment and Public Relations ($p<.01$). Whereas, the low stress group exhibited congruent patterns with Directive leaders promoting Achieved Excellence ($p<.05$) and Supportive leaders emphasizing Athlete Personal Growth ($p<.01$). Results of the present study are discussed within the context of Role Dynamics Theory (Kahn, et al., 1964).

FEMALE COACHES IN THE STATE OF ILLINOIS: A STATUS REPORT. Paula M. Schneider, Churchville Junior High School, IL; Susan Wilkinson, University of Illinois at Chicago.

Since 1972 girls' participation in high school athletics has grown at an astounding rate, but the employment of female coaches has declined substantially (Acosta & Carpenter, 1985; Hart, Hasbrook, & Mathes, 1986). This study's purpose was to determine the number of female coaches employed in Illinois. A survey was mailed to all principals of Illinois High School Association class A and AA public high schools. 429 surveys (64%) were returned. Principals reported that they employed 7,166 different persons to coach an interscholastic team (5,349 male and 1,817 female). Only 25% of the persons employed were female. Given the probability that one person coaches more than one sport, it was reported that 6,308 positions were required to fill positions for boys' teams and 3,677 positions were required to fill positions for girls' teams. 1,685 men occupied a position on the football coaching staff. 96% of the remaining 4,632 boys' teams were coached by men and 239 women (4%). Women coached 54% of the 3,677 girls' teams and men occupied 46% of those coaching positions. Where prior to 1972, girls would have had a ten out of ten chance to be coached by a female, they now only have a five out of ten chance to be coached by a female. Research continues to support that same gender role modeling is important, preferential, and necessary (George, 1988; Knoppers, 1987; Whitaker & Molstead, 1988). Since a young adult's values and attitudes are influenced by the adult role models they encounter, perceptions of future career opportunities and the life choices one perceives as having available are most directly influenced by adult role models. With the decline in female coaches, the need for female role models in athletics has become increasingly more important for young girls. Without a break in the cycle the trend in the declining number of professional women will most likely continue in generations to come. Strategies that increase the number of women coaches who provide a quality sport experience for girls needs to be continually investigated.

A DESCRIPTION OF TEACHER ACCOUNTABILITY IN PHYSICAL EDUCATION.

Jacalyn Lund, University of Louisville.

The purpose of this study was to describe teacher accountability in physical education. In his research on task structures, Doyle found that accountability drives the system; without accountability, the task does not exist. Tousignant concurred with Doyle's findings in her study on task structures in physical education. Despite this stated importance of accountability, this factor had not been studied specifically in physical education using the task structure lens. Using descriptive analytic methodology, volleyball units taught by five teachers at three different sites were observed. Two more and two less skilled target students from each teacher were selected. Student responses were analyzed for both topographical correctness and success of results. In addition, lessons were coded to determine the amount of time spent on management, activity, waiting, transition, off-task behavior, and knowledge. Four broad categories of accountability emerged from the data: monitoring, aversives, public recognition, and grading. Subcategories for each of these topics were also identified. Accountability was determined to have a hierarchical configuration with monitoring being the basis for this structure. Some teachers tended to use the same form of accountability consistently with a type of activity whereas others mixed accountability and tasks. Although a direct comparison of task response frequency between students was not possible because of the diverse nature of the tasks, indirect comparisons were made. Teachers who implemented forms of accountability beyond monitoring tended to have higher response frequencies than those who did not. In past research, the highest response frequencies were associated with grading or evaluation. Response frequencies were obtained in this study that were equal to or better than those using grading accountability. Teachers held students accountable for optimal performances without the formality of recording student responses. In addition, the teacher with the lowest activity time in this study had more total responses per lesson as well as the most cumulative responses for the unit. These responses were executed in short activity segments making more time available for knowledge/ instruction using refinement and extension tasks. The study concluded that accountability techniques can enhance student performance. Students maintained high response rates when practice drills were repeated on several consecutive days. Teacher accountability was also used to prevent student satiation. Factors other than activity time need to be considered for measuring effective teaching.

MENSTRUAL DISORDERS AMONG INTERCOLLEGIATE ATHLETES AND NON-ATHLETES: PERCEIVED IMPACT ON ATHLETIC PERFORMANCE AND PREVENTIVE-MEDICAL PROTOCOL FOR THE FEMALE ATHLETE.

Carol Wilson, University of Virginia, Charlottesville, Va. and William R. Keye, Beaumont Fertility Hospital, Grand Rapids, Michigan.

Sixty-two (62) intercollegiate female athletes and 88 non-athletes were surveyed for menstrual disorders. The survey requested information concerning the timing and duration of menses, as well as the presence or absence of oligomenorrhea, bleeding at irregular intervals of 40 days or more; dysmenorrhea, painful menstruation; premenstrual symptoms, a combination of time-delineated physical, emotional, social and/or behavioral symptoms that occur before menstruation and regress or disappear during menstruation, the occurrence of which interferes with quality of life; and amenorrhea, an absence of menses for at least six months. In addition, the athletes were asked if dysmenorrhea and premenstrual symptoms decreased their athletic performance. The results of the survey indicated that the athletes 13 (21%) experienced significantly more amenorrhea ($p<.001$) than the non-athletes (0%). However, there were no significant differences between athletes and non-athletes in reported oligomenorrhea, dysmenorrhea, and premenstrual symptoms. In addition, 31 (50%) of the athletes believed that dysmenorrhea and premenstrual symptoms decreased their athletic performance. The results of this survey suggest that female athletes are not less likely to experience menstrual disorders than non-athletes. Thus, an educational and medical screening protocol for menstrual disorders should be established for female athletes, not only to enhance athletic performance and quality of life, but to help preserve the health and reproductive potential of the athlete.

RELATIONSHIPS BETWEEN STATIC BALANCE PERFORMANCE AND VESTIBULAR SYSTEM FUNCTIONING IN YOUNG CHILDREN

Sherry L. Folsom–Meek, Diana Baldwin, Michelle Chouteau, University of Missouri–Columbia

Comprehensive psychomotor evaluations by adapted physical education teachers and therapists include assessment of balance and its underlying sensory–integrative processes, one of which is functioning of the vestibular system. This is most commonly measured by observing the duration of postrotary nystagmus (PRN) according to the protocol of the Southern California Postrotary Nystagmus Test (SCPNT) (Ayres, 1975). Certification is required to administer the SCPNT and is largely limited to occupational and physical therapists. Use of this test by physical educators is in clear violation of assessment guidelines for Public Law 94–142 and thus offers potential vulnerability for lawsuits. The purpose of this study was to determine relationships of PRN duration to eight static balance tests. Determination of balance tests that are highly related to PRN duration should support the interchangeable use of specific static balance tests for physical educators' assessments of children's vestibular functioning. Subjects were 104 six– and seven–year–old children from 13 elementary school classrooms. All subjects were normal achievers in school and free of speech/language, sensory, physical, and neurological disorders. Each subject was individually administered eight static balance tests by the principal investigator and the SCPNT by a certified occupational therapist. Data were analyzed by SAS on the university mainframe computer and included descriptive and multiple regression statistics. Standard multiple regression was used with the two balance tests that were significantly correlated with PRN duration. With analyses by gender and age, R^2 coefficients indicated large effect sizes for 6–year–old females (.38), 7–year–old females (.26), and 6–year–old males (.67) and a medium effect size for 7–year–old males (.14). Due to curvilinearity of the data, polynomial regression was used to generate the best balance tests for predicting PRN duration. For both female groups and 6–year–old males, the best model was a quadratic function whereas for 7–year–old males it was a linear function. Based on the results of this study, the investigators conclude there is tentative support for using specific static balance tests for each gender and age group to assess children's vestibular functioning.

[Funded by the CEA Visiting Scholar Grant at the University of Missouri]

PERCEPTIONS OF REALITY IN STUDENT TEACHING: A QUALITATIVE ANALYSIS.

Lynda E. Randall, California State University, Fullerton; Jeanette Askins, Florida State University.

This study examined the perceptions of three student teachers as they completed a 15-week internship in public school physical education. Specifically, the study was designed to describe their feelings and cognitions related to success and failure (positive and negative experiences); areas of focused attention; meaningful events; and extraneous observations. Subjects in the study were three female student teachers: two interning at elementary level and one at secondary level. All had completed the prescribed course of study in professional preparation, and were scheduled to graduate at the end of the final practicum. Data were collected through the transcription of audiotaped journals recorded weekly by the student teachers. On Friday afternoon of each week, the student teachers responded orally to four focused questions: 1). How did you feel generally about your student teaching experiences this week? What did you feel positively about? What were your concerns? 2). What were you thinking about during your teaching and observation this week? Describe your thoughts. 3). Were there any important events this week that had a substantial impact upon your knowledge and attitudes about teaching? 4). What other thoughts and comments do you wish to share? The resultant audiotaped data consisted of approximately two hours of verbalizations for each student teacher, an average of 12 minutes per student teacher per week. These data were then converted to verbatim scripts by the use of dictaphone. Analytic induction and constant comparison techniques were used to identify trends in the responses of the patterns. The inclusion of three subjects allowed for triangulation of data. In addition, a discomfort relief quotient formula was used to compute the proportions of positive and negative affects reflected in the comments. The three student teachers differed in the amount of dissonance expressed. Positive (relief) statements comprised 23.3%, 53.8%, and 57.1% of the feeling statements recorded, as compared to negative (discomfort) statements of 76.7%, 46.2%, and 42.9% respectively. With regard to the major research questions, a number of trends emerged. 1). Analysis of feelings and cognitions revealed that the positive affects and impressions of the student teachers related to interacting with students; relating to cooperating teachers; implementing successful lessons; learning new teaching strategies; and gaining confidence and control. Evident sources of dissonance or concern included difficulties in implementing theory into practice; disciplinary problems; transition shock; and feelings of unpreparedness or inadequacy. These negative feelings were most salient during the first five weeks of the practicum, and were gradually replaced by feelings of increased efficacy. Two dominant needs reflected were the desire for approval and the desire for more guidance/information. 2). The student teachers tended to focus on survival (self), task, and impact concerns throughout the practicum. In earlier reports, however, greater concern was present for keeping students interested and involved. Attention later shifted to skill development and conceptual processes. 3). Events that provided meaningful learning experiences involved a variety of themes; including disciplinary episodes, confrontations with school personnel, evaluations by supervisors, and success and failure of lessons. 4). Additional themes evidenced in the content reflected a struggle to avoid the progressive-traditional shift; concerns for selecting and sequencing content; and the targeting of specific teaching behaviors for attainment.

THE ROLE OF FALSE DICHOTOMIES IN THE DEVELOPMENT OF NOVICE TEACHERS' CURRICULAR KNOWLEDGE

Inez Rovegno, University of Illinois

Research on conceptual change and advanced knowledge acquisition consistently reports the development of misconceptions as a result of prior knowledge and a variety of simplification mechanisms. Little research, however, has been done in real-world settings with complex knowledge that is used in practice. This paper reports part of the results of a larger study of conceptual change and curricular knowledge acquisition in 12 novice teachers (eight preservice and four first-year elementary physical education teachers) from the same undergraduate program. The pretraining experiences of the 12 novices were in traditional sport programs. The undergraduate program focused on a movement approach, thus, necessitating the acquisition of new knowledge that was complex and discrepant from the novices' prior conceptions. The research addressed the following: (a) How did the novices' knowledge develop? (b) What aspects of the movement approach did they find problematic? (c) What role did their prior knowledge play in what and how they learned? Guidelines of the interpretive research paradigm were followed. The eight preservice teachers were observed and field notes taken during an elementary instruction/content course over a six week period. Each preservice teacher was video taped and observed teaching in field experiences for two half days. The four first-year teachers were observed teaching from two to six full days. Informal interviews were conducted as often as possible. Two one-hour, formal interviews were conducted with each novice. The second interview included observing and discussing a video-taped lesson. Available relevant documents were collected. Interview questions and extensive probes focused on concepts the novice found problematic. Often an entire interview focused on one to three related problems. The data from all sources were triangulated. Each novice's experiences and conceptions were summarized and examined for common themes. Findings were verified through source checking. The novices oversimplified knowledge resulting in misconceptions and confusion about content selection and teaching behaviors. The major mechanism for simplifying was false dichotomies. Despite instruction by university and cooperating teachers to the contrary, there was a tendency for novices to categorize concepts (e.g., game strategy, competition) in either a movement or a traditional sport approach. Categorization led to associations that were sometimes inappropriate. Because the novices considered the movement approach to be educationally better than their prior experiences, the false dichotomies were powerful for organizing knowledge. Although the false dichotomies were problematic, they also allowed for an initial understanding of and pride in the movement approach.

THE EFFECT OF MODELING AND VERBAL REHEARSAL ON THE MOTOR SKILL PERFORMANCE OF HISPANIC ESL CHILDREN

Karen S. Meaney and Rosaland V. Edwards, University of Houston

Physical education instructors often utilize modeling or demonstration to transmit task relevant information to the learner. Recent investigations (Edwards & Meaney, 1990; McCullagh, Weiss & Ross, 1989; Weiss, Ebbeck, & Rose, 1990; Weiss & Klint, 1987) found that subjects who received a verbal rehearsal strategy as part of the modeling condition performed significantly better than subjects who received demonstration only. The subjects for these studies were children who speak English as a first language. Little, if any, research has investigated the effect of modeling on the motor skill performance of children who speak English as a second language (ESL). With the population of ESL students growing each year, it is imperative that investigations be made as to what techniques may enhance their motor skill performance. The purpose of this study was to determine what effect, if any, different modeling conditions would have on the motor performance of Hispanic ESL students. Subjects for this study were 64 fourth graders enrolled in a local elementary school. Thirty-two of the subjects were children whose primary language was English, the remaining subjects were Hispanic ESL children. The background data on the ESL children revealed that their mean participation time in the bilingual program had been 2.5 years and all had successfully exited the program. The subjects were randomly assigned, by gender and primary language, to one of four modeling conditions: Verbal model only (demonstration), verbal model plus verbal rehearsal (show and tell), verbal rehearsal only, and no model/no rehearsal (control). All subjects first received instructions on what they would be required to do followed by specific information with regard to their instructional protocol. The task consisted of a 6 part motor skill course in which children were asked to perform a specific sequential order. This task was identical to the one used by Weiss & Klint (1987) and Edwards & Meaney (1990). The data were analyzed in a 4 (condition) x 2 (gender) x 2 (language) ANOVA using average number of skills performed correctly as the dependent measure. Results revealed main effects for gender, condition, and condition x language interaction. Males performed significantly better than females, all groups performed significantly better than the control group, and the verbal model plus verbal rehearsal (show and tell) group performed significantly better than the verbal model only group. Post-hoc analysis for the condition x language interaction revealed that subjects in the verbal rehearsal only group who speak English as a first language and subjects in the ESL show and tell group performed significantly better than the ESL subjects in the verbal rehearsal only group and control group who were not different. The results of this study indicate that the child's primary language is an important variable to consider when selecting modeling techniques to enhance motor skill performance. ESL subjects benefited most from a condition which included a demonstration while their English speaking counterparts benefited most from a condition which included a verbal rehearsal strategy.

THE EFFECTS OF PLAYING AND TEACHING EXPERIENCE ON ABILITY TO IDENTIFY CRITICAL FEATURES OF THE TENNIS SERVE

Gail L. DiCicco, University of Pittsburgh

The purpose of this study was to determine if expert diagnosticians identified critical features of the tennis serve differently than those with less experience. Thirty-six adult male subjects represented four experience groups: high playing/high teaching (tennis professionals), high playing/low teaching (advanced tennis players), low playing/high teach (physical education teachers), and low playing/low teaching (undergraduate physical education majors). All subjects viewed videotapes of a tennis serve and were asked to identify errors. A videotape of one advanced server and one beginning server were viewed. While viewing the videotapes, the subjects reported errors. Audiotapes of the verbal reports were transcribed. Errors were extracted from the protocols and categorized into five phases of the serve: 1)position, 2) preparation, 3)acceleration, 4)follow-thru, and 5) combined. The design was a 2(playing experience) X 2(teaching experience) X 5(phase) X 2(tape condition) with repeated measures on the last 2 factors. An ANOVA was calculated with number of errors diagnosed as the dependent variable. Features within each phase were also examined using a 2(play) X 2(teach) X 2(tape condition) X (features). Five ANOVA's were calculated with the number of features varying across phases. The Anova for phases revealed a P X T X PHASE X TAPE interaction. All the groups were similar for the position, follow-thru, and combined phases. In the acceleration phase all experience groups were similar for the beginning tape but the tennis professionals reported more errors for the advanced tape condition. The follow-thru phase was rarely used by all groups. The combined phase was most extensively used and the preparation phase the second most used for all groups. The combined phase was used significantly by the high playing and high teaching experience groups. The preparation phase was used extensively by the low playing group. The ANOVA for features revealed the phase categories used most often: position (foot fault), preparation (toss), acceleration (weight transfer, contact), and combined (toss, timing). Teaching and playing experience does effect diagnostic skill. The results should provide valuable information to teacher training programs.

HIGH SCHOOL STUDENTS AS PROSPECTIVE PHYSICAL EDUCATORS: REVIVAL OF THE SUBJECTIVE WARRANT.

Gayle E. Hutchinson, California State University, Chico; Patt Dodds, University of Massachusetts, Amherst.

As individuals become interested in careers they begin making assumptions about the requirements, skills and abilities necessary for performance in particular occupations. This is known as subjective warrant. The purpose of this paper is to examine how the subjective warrant toward physical education careers has developed in early deciding high school students. Ten high school students from low to middle socioeconomic backgrounds and who attended rural and urban high schools participated in this study. Four open-ended semi-structured interviews and roleplays were used to collect the participants' perspectives on teaching. All interviews were audiotaped and transcribed. Efforts were made to protect the anonymity of each participant. Researcher-constructed categories and themes were drawn from data via inductive analysis. Three assumptions as described by Lawson (1983) were used to frame the discussion of the development of the subjective warrant: (a) socialization is a lifelong process, (b) operations in physical education are institutionalized, and (c) socialization is always problematic. Lawson's first assumption, that socialization begins early, was demonstrated by the detail in participants' perspectives on teaching, even during the recruitment stage prior to formal training. For example, their perspectives on teaching included assumptions about the nature of physical education, specific actions and strategies they would use as teachers, and definite views about the relationships between teaching and coaching. Lawson's second assumption, about the custodial nature of most physical education programs, is illustrated by participants' clear preoccupation with maintaining control of students. This custodial ideology was illustrated by five aspects of teaching: (a) relatively mindless reliance on daily routines in their programs, (b) teacher-centered management of classes, (c) a multi-activity, team sport-centered curriculum, (d) minimal planning to control students rather than help them learn, and (e) grading students on following rules rather than acquiring skills. Lawson's third assumption, that socialization into physical education careers is a dialectic between individuals and their environments, was evidenced by differences in perspectives that existed among participants' perspectives reflected custodialism, some participants indicated more innovative approaches to teaching physical education. In summary, this qualitative analysis of high school students' perspectives about teaching provides detailed evidence that as early deciders for teaching careers they have already elaborate images of their future work.

Lawson, H.L. (1983). Toward a model of teacher socialization in physical education: The subjective warrant, recruitment and teacher education. *Journal of Teaching Physical Education*. *2*(3), 3-16.

EFFECTS OF COMPONENT-SPECIFIC INTERVENTIONS ON OVERHAND THROWING PERFORMANCE OF PRESCHOOL CHILDREN.

Judith L. Oslin, The University of Alabama

A variety of instructional techniques such as feedback mental practice, modeling, and use of demonstrations have been examined by physical education researchers to determine the effect on motor skill acquisition and performance. However, most physical education research paradigms have measured improved performance via product variables, such as target scores or trials to criterion. Although process measures of sport skill can provide information regarding how motor skills are learned, they have been avoided due to lack of valid and reliable methods to measure changes in performance from one trial to the next. The purpose of this study was to use component-specific instruction (CSI) to increase the developmental levels of nine components of overhand throwing (Siedentop, Herkowitz, & Rink, 1984). The Sport Skill Process Variable Assessment Instrument (Stroot & Oslin, 1990), was used to determine overhand throwing performance of preschool children. An archery target was used to assess accuracy and served as a product measure for throwing performance. Component-specific instruction was presented in two different sequences: 1) Force production sequence, and 2) forward chaining sequence. A multiple baseline design across subjects was used to analyze the effects of CSI upon all components of each throwing response and allowed for testing of two component sequences. Experimental sessions were conducted in a portable environment, designed to provide optimum control within the confines of the preschool setting. Seven females from a local preschool, 3.4 to 5.8 years of age, participated in the study. Experimental sessions were held from 2 to 5 days per week. The number of sessions required to meet criteria of 20 consecutive throws with all components at high efficiency ranged from 13 to 26. Five CSI interventions were required: step, rotation/backswing, elbow/backswing, forearm/forward, and rotation/forward. Intervention strategies improved efficiency levels for components specific to overhand throwing performance for all subjects, with no difference between subjects in the force production sequence and subjects in the forward chaining sequence. Significant correlations resulted between percent of hits on target and percent of high efficiency throws for five of seven subjects. Residual effects occurred consistently in corresponding components.

TEMPORAL STRUCTURE OF A THREE-DIMENSIONAL SOCCER INSTEP KICK

Cynthia L. Tant, Iowa State University, Ames, IA
Jerry D. Wilkerson, Texas Woman's University, Denton, TX

Kicking is a basic skill used in a variety of sport activities. Researchers have indicated that kicking a ball is dependent on a correctly timed sequence of body segments (Dunn & Putnam, 1988). The purpose of this study was to investigate the timing, sequence, and interaction of segments associated with three different soccer instep kicks. Eight male Division I intercollegiate soccer players were filmed performing a low drive, high drive, and maximum distance instep kick. Subjects were filmed from the sagittal and frontal views with two 16 mm high speed cameras operating at 200 frames/sec. Films were digitized and the synchronized X, Y coordinates were entered into the Direct Linear Transformation (DLT) computer program for generation of the X, Y, Z three-dimensional (3D) coordinates. The 3D points were then smoothed with a digital filter and entered into a computer program based on a 3D linked model of the kicking leg. Displacements, velocities, accelerations, and temporal sequences were determined from the 3D data. The temporal structure of the three different kicks was divided into 5 events defining 4 phases. The events were maximum thigh back (MT), heel strike of the support leg (HS), maximum shank back (MS), ball contact (BC), and ball takeoff (BT). The structure of the temporal phases was very similiar for all three kicks. The sequential/simultaneous movement of the kicking leg was examined through shared positive contributions of the segments. A high percentage (80%) indicated simultaneity of segmental movement for the pelvis and thigh. A low percentage (30%) indicated a sequential movement between the thigh and lower leg. A one-way ANOVA with repeated measures was utilized to investigate the relative timing of the pelvis, thigh, and lower leg. No significant differences were found between the segments during each kick. In conclusion, the pelvis and thigh demonstrated a simultaneous pattern of movement to assist in accuracy of the kick. The thigh and lower leg exhibited a sequential pattern of movement to aid in obtaining maximum velocity. The relative timing of the pelvis, thigh, and lower leg was invariant across different types of soccer instep kicks which could indicate a common temporal structure for the soccer instep kick.

A COMPARISON OF TECHNIQUES USED FOR BLOCKING AND CONTROL OF THE SOMERSAULT IN THE HANDSPRING AND SALTO FORWARD TUCKED VAULT AT THE 1986 USA CHAMPIONSHIPS AND 1988 OLYMPIC GAMES.

Yoshiaki Takei, Northern Illinois University.

The handspring and salto forward tucked vault is regarded as one of the most important "common denominator vaults" because it provides an extensive array of carry-over elements for advanced vaults. Vaults of greater complexity can therefore be learned more easily and safely once this vault is mastered. The purpose of the study was to gain insight for performance improvement by comparing the techniques of blocking and somersaulting in the handspring and salto forward tucked vault used by two groups of elite male gymnasts. Forty-one USA gymnasts (UG), were compared with 51 Olympic gymnasts (OG). A 16 mm high-speed camera was used to record the performance of the gymnasts from China, East and West Germany, Japan, Soviet Union, and 6 other countries during competition in the 1988 Olympic Games. A deterministic model was developed to identify the mechanical factors for comparison and subsequent analysis. After the films were digitized, established methods for data smoothing (Wood, 1982), and for computation of angular momentum (Hay et al., 1977; Whitsett, 1963) were applied. Results of comparisons (significant at the .001 level unless otherwise indicated) showed that OG contacted the horse with greater horizontal velocity (v_H), had greater normalized horizontal forces exerted, which resulted in greater reduction of v_H on horse, and consequently departed from it with a v_H similar to UG. OG contacted the horse with a vertical velocity (v_V) similar to UG, had a greater normalized vertical forces exerted ($p < .005$), and departed from it with greater v_V. OG contacted the horse with greater normalized angular momentum (H) ($p < .002$), had greater reduction of H while on horse, and yet departed from it with greater H. OG contacted the horse with greater normalized moment of inertia (I), had greater average I on horse, and departed from it with greater I and with the body position more nearly vertical than UG. This meant that OG kept their body more extended than UG while on horse and focused on full completion of blocking and well timed departure from the horse rather than rushing the somersault. OG assumed the tightest tuck position during the somersault nearer the instant of peak of postflight ($t = -4.23$, $p < .001$) and thus achieved greater height of CG at the tightest tuck position ($t = 4.69$, $p < .001$). The superiority of body control by OG after the tightest tuck to landing was evidenced by (a) longer time ($t = 5.63$, $p < .001$), (b) larger horizontal ($t = 5.07$, $p < .001$) and angular ($t = 3.80$, $p < .001$) distances, (c) greater I ($t = 7.44$, $p < .001$), and (d) smaller angular velocity ($t = -5.32$, $p < .001$) found between the above two instants. This enabled OG to rapidly extend the body well above the horse, maintain the extended body position in mid-air as they slowly rotate the body over greater horizontal and angular distances, and prepare for a controlled landing, all of which the judges are seeking.

MASS-VELOCITY EFFECTS ON ENHANCEMENT OF THE CONCENTRIC PHASE DURING DROP JUMPING.

Rick N. Robertson, Ph.D., Biomechanics Laboratory, HPE Dept., California State University Sacramento and Rush F. Green, M.S., Muscle Mechanics Laboratory, PE&HMS Dept., University of Oregon.

The purpose of this study was to determine if a differential enhancement of the concentric phase occurred during drop jumps of varying height and mass. Additionally, the role of each of these components in this process was studied. Four female jumpers performed 5 drop jumps for each of 9 conditions consisting of all combinations of 3 drop heights (20, 40, and 60 cm) and 3 added masses (0, 7.5, and 15% body weight). Joint position data (SELSPOT Video System) and simultaneous ground reaction force and moment data (AMTI force plate) were collected every .020 seconds. Combining this data with anthropometric measurements resulted in the generation of 41 variables describing joint kinematics and kinetics during both eccentric and concentric phases of the jumps. Group and single-subject repeated measure ANOVAs were run on the variables to test for differences between conditions. Subjects performed as was expected during the eccentric phase, in that, for conditions with higher momenta the mechanical output at the joints increased (eccentric impulse, peak joint powers, and joint work increased with both higher jump heights and larger added masses). During the concentric phase the subjects varied considerably particularly for impulse, joint work and peak joint powers, with main effects mass and height being generally non-significant. These results showed that for increases in eccentric load on the muscle resulting from larger incoming velocities and higher loads that no increases in concentric output occurred (impulse, peak power or work) when data were collapsed across subjects. Individual subjects demonstrated varying degrees of concentric enhancement, but this was not consistent. It is suggested that two factors may have affected these results. Although, knee angle was controlled and most subjects performed consistently from condition-to-condition, rate of loading during the eccentric phase may have varied, which may influence the enhancement process. During the concentric phase the complexity of interactions among joints in the lower extremity and the influence of two-joint muscles may have resulted in a less than optimal interaction among segments, particularly as the subjects, although jumpers, were not specifically trained at the experimental conditions. It is suggested that there exists a number of optimal strategies that a person utilizes to achieve maximal output, such that individual joint output varies from trial-to-trial to achieve a consistent and optimal overall output.

DYNAMIC STRENGTH AND PERCEIVED EXERTION AMONG ACTIVE AND SEDENTARY WOMEN THROUGHOUT THE MENSTRUAL CYCLE

Ro Di Brezzo, Inza L. Fort, Melinda Boorman & Burch Oglesby, University of Arkansas, Fayetteville.

The purpose of the study was to examine dynamic strength variables and perceived exertion during different phases of the menstrual cycle in active and sedentary women. Eighteen women volunteers were classified as untrained but physically active (A, n=9) or sedentary (S, n=9). Each subject was tested during three phases of the menstrual cycle: menses (within first 48 hours of flow); ovulation (14-21 days after menses according to a rise in basal body temperature); and luteal (5-7 days after ovulation). Blood samples were taken for the ovulation and luteal phases and subjects were followed for two cycles. Dynamic strength was measured by the knee flexors and extensors at 180 deg/sec and 240 deg/sec on the Cybex II Isokinetic Dynamometer. Perceived exertion (RPE) was measured by Borg's scale. Data were analyzed by a two-way ANOVA for cycle phase and activity group. Results indicated that peak torque values for extension and flexion at the knee were not significantly different across the cycle phases within the A and S groups but were significantly higher (10-17%) for A subjects than the S subjects at 180 deg/sec. RPE was 5% higher for S subjects than A subjects at menses and 8% higher during the luteal phase, but was slightly lower at ovulation. Endurance of the knee flexors and extensors was evaluated by comparison of the first three repetitions with the last three in a 20-repetition set at 240 deg/sec. Performance was not significantly different across the cycle phases. Endurance ratios between the groups at the ovulation and luteal phases were 5-13% less for the S group than for the A group. RPE was not significantly different across the cycle phases for endurance but RPE of the S subjects averaged 3-10% higher than reported by the A subjects. For this study, variations in dynamic strength with its perceived exertion seemed to be more a function of activity level than effects of the menstrual cycle.

A COMPARISON OF MASSAGE AND ACUPRESSURE TREATMENTS ON MUSCLE RELAXATION

Fang C. Chen and Barry T. Bates, University of Oregon

Acupressure and massage treatments have been used by athletic trainers and medical professionals to relax muscles, but few researchers have directly compared the effects of these two methods for reducing muscle tension. The purpose of this study was to compare the immediate and short term effectiveness of both acupressure and massage in reducing muscle tension following a weight training exercise. Ten males volunteered as subjects. Five conditions (one per week) were administered to each subject in random order. The five conditions included were acupressure, massage, acupressure plus massage, placebo and control. All treatments were administered by the same individual following an exercise bout of arm curls to fatigue. Elbow angle was used as the dependent variable to indicate the degree of muscle relaxation. A base line value (n = 3 trials) was obtained prior to exercise along with a post-exercise value and nine post-treatment values during the 14 minutes of rest following the treatments. T-tests revealed a statistically significant decrease ($p < 0.001$) in elbow angle between baseline and post-exercise measurements and a significant increase in elbow angle from post-exercise to post-treatment ($p < 0.001$). A one factor **MANOVA** was used to test the effect of time following treatment (due to the intercorrelations among the time variables). The **MANOVA** results indicated a significant main effect of time (Wilks', $p < 0.001$) with no between subject main effect. A significant Condition X Time interaction ($p < 0.001$) indicated that the treatments had a different effect in terms of relaxing the muscle. The simple condition main effect for each time was evaluated using an univariate analysis of variance. Significant differences were exhibited immediately following treatment, as well as 10, 12, and 14 minutes after the treatments. The Tukey test further indicated that treatments involving massage tended to have a better immediate effect (greater elbow angle) while the effects of acupressure were variable until 10 minutes after which its effects were better than massage. In summary, the effect of acupressure occurred at a later time but it eventually had a greater effect on muscle relaxation. A combination of acupressure and massage treatment is suggested for overall comfort and effectiveness.

REFERENCES

Daun Zian-Pen (1986), *J of Beijing Inst. of PE,* 3: 72-80
Nordschow et al (1983), *J of Am Phys Ther Assoc.*, 18: 134-135
Wiktorrson-Mlooer et al (1983), *Am J of Spt Med,* 11: 294-251
Zhang Lu (1986), *The J of Zhungdo Inst of PE,* 3: 72-80

316

MULTIDIMENSIONAL TRAIT ANXIETY AS A PREDICTOR OF MULTIDIMENSIONAL STATE ANXIETY

Vikki Krane, Bowling Green State University, and Laura Finch, University of North Carolina at Greensboro

Recently a multidimensional trait measure of anxiety has been developed: the Sport Anxiety Scale (SAS; Smith, Smoll, and Schutz, in press). This inventory measures trait cognitive anxiety, somatic anxiety, and concentration distruption. The finding that unidimensional trait anxiety is a strong predictor of unidimensional state anxiety is among the most consistent findings in the sport psychology literature (Klavora, 1977; Martens, 1977; Sonstroem & Bernardo, 1980). This relationship has also been upheld when using a unidimensional measure of trait anxiety as a predictor of state cognitive and somatic anxiety subcomponents and state confidence (Crocker, Alderman, & Smith,1988; Gould, Petlichkoff, & Weinberg, 1984; Martens et al., 1990). Because the SAS is a new tool, this finding has not been replicated with the multidimensional trait anxiety subcomponents as predictors of the respective state anxiety subcomponents. The present study was designed to examine the relationships among trait cognitive anxiety, trait somatic anxiety, and trait concentration disruption, and state cognitive anxiety, state somatic anxiety, and state confidence. It was hypothesized that the strongest relationships were expected between trait and state cognitive anxiety and trait and state somatic anxiety. Concentration disruption was expected to be a better predictor of the state cognitive factors of cognitive anxiety and confidence than state somatic anxiety. Two separate samples completed the multidimensional trait anxiety measure, SAS, in a noncompetitive environment and a multidimensional state anxiety measure, the Competitive State Anxiety Inventory (CSAI-2), just prior to a competitive event. The first sample consisted of 170 collegiate tennis and golf athletes. The SAS was adminstered during a team meeting or practice session not associated with any specific competitive event. The athletes completed the CSAI-2 within thirty minutes of a competitive golf or tennis event. As expected, results of canonical correlations and multiple regression analyses indicated that the trait anxiety subcomponents significantly predicted the state anxiety subcomponents. Specifically, trait cognitive anxiety, trait somatic anxiety, trait concentration disruption were the strongest predictors of state cognitive anxiety, state somatic anxiety and state confidence respectively. The second sample consisted of 18 female collegiate soccer players at a nationally ranked NCAA Division II university. These athletes completed the SAS at a team meeting prior to the beginning of their competitive season. The CSAI-2 was completed within thirty minutes of the beginning of each of twelve competitive matches during their season. Canonical correlations were computed between the trait and state subcomponents of anxiety for each of twelve competitions across their competitive season. Results revealed a significant canonical correlation only on the first of the twelve competitions. Trait somatic anxiety followed by trait cognitive anxiety contributed most to the canonical correlation for the first match. Results of the first sample support the need for delineation among trait anxiety subcomponents and provides validation support for the SAS. Although results of sample two did not support the hypotheses, unique characteristics of this team may have influenced the results.

MODELING THE INFLUENCE OF SOCIAL SUPPORT AND EFFICACY COGNITIONS IN THE EXERCISE BEHAVIOR OF SEDENTARY ADULTS: A STRUCTURAL EQUATION ANALYSIS

Terry E. Duncan, Oregon Social Learning Center

Although there has been a considerable amount of research establishing the beneficial effects of social support on health and well-being, relatively little work has focused on those processes by which social support influences health promoting behaviors. People's beliefs concerning their capacity to exercise control over their own motivation and behavior can have a significant impact on those physiological systems which affect the development of chronic health dysfunctions. Various lines of research demonstrate converging evidence suggesting that self-efficacy operates as one such cognitive mediator linking psychosocial influences to positive health functioning. Recent advances in structural modeling techniques allow for the estimation and testing of complex models representing such social and behavioral processes. However, most reported applications in sport and physical activity have been limited to simple models involving observed variables measured at a single point in time. Because these models generally fail to consider reciprocal causation, auto-regressive effects, and the influence of measurement error, the present study utilized both cross-sectional and longitudinal latent variable structural equation modeling techniques to determine whether self-efficacy served a mediational function in explaining the influence of social support on exercise behaviors. Subjects were sedentary adults (N=85) participating in a five month exercise program. Data pertaining to the variables of interest was collected during the 10th week of the exercise program, and again at program termination. Cross-sectional analyses suggested that self-efficacy served a mediational function in explaining the effect of social support on exercise behaviors. Results from the longitudinal analyses, however, indicated that self-efficacy was less of a factor in determining subsequent exercise behaviors than were prior exercise behaviors. These results suggest that self-corrective action and self-referent thought might be necessary only in those circumstances when environmental demands far exceed one's perceived capabilities. Social support emerged as a significant source of efficacy information in both the cross-sectional and longitudinal models. Findings are discussed in terms of the utility of structural equation modeling techniques for understanding the complex social and cognitive processes involved in exercise behavior.

318

PERCEIVED COACHING STRENGTHS AND WEAKNESSES OF NOVICE WOMEN COACHES.

Heather Barber, Maureen R. Weiss, Becky L. Sisley, University of Oregon; and Vicki Ebbeck, Oregon State University

The declining percentage of women in the coaching profession has been well documented in both interscholastic and intercollegiate athletic programs. While athletic directors have attributed the causes of this decline to discrimination in hiring practices, strength of existing networks in athletics, lack of qualified women coaches, and an unwillingness of women coaches to meet the demanding schedule associated with coaching (Acosta & Carpenter, 1988), a gender bias has also been found in athletes' perceptions of coaching competence (Hasbrook, Hart, Mathes, & True, 1990; Williams & Parkhouse, 1988). However, studies have not yet examined women's perceptions of their own strengths and weaknesses as coaches. Therefore, the purpose of this study was to investigate women coaches' perceptions of their strengths and weaknesses following a coaching internship experience. Qualitative methods were used to gain an in-depth understanding of coaches' perceptions of their abilities. Specifically, detailed interviews were conducted with 28 novice women coaches who had participated in a one-week intensive coaching workshop, as well as completed a season-long internship as an assistant or head coach. An inductive content analysis (Patton, 1980) of the transcribed interviews provided a framework analogous to a "conceptual factor analysis", which allowed themes to emerge from the data and categories of strengths and weaknesses to be derived. The analysis proceeded with the original quotes and progressed through lower and higher order themes to the final categories. Each level of the inductive process involved consensual agreement by the investigators. Coaching strengths that emerged included: 1) Communicating Effectively with Athletes, 2) Teaching Physical and Social/Moral Skills, 3) Motivating Athletes, 4) Knowledge of the Game, 5) Maintaining Discipline; and, 6) Balancing Work and Fun. The weaknesses that these coaches perceived in their abilities included: 1) Experience with Sport-specific Skills and Strategies, 2) Leadership Skills, 3) Planning and Management, 4) Injury Prevention and Maintenance; and, 5) Physical Skills Necessary for Effective Demonstrations. The implications of these findings will be discussed in relation to the construct of perceptions of ability, reasons for the decline in the percentage of women coaches, and the development of coaching education programs.

RELATIONSHIP OF SELECTED VARIABLES IN THE ASSESSMENT OF PARTICIPANT LEADERSHIP QUALITIES.

Mary E. Engelman and Dale G. Pease, University of Houston.

Leadership is generally believed to be a desired participant outcome of a sport experience. While many studies have focused on the formal leadership structure, primarily the role of the coach, few studies have investigated the participant leadership variables within the team structure. The purpose of this study was to investigate the relationship of selected psychological and participation variables on player and coach assessments of participant leadership and to determine if level of play influences the role of these variables in the assessment process. An intact community soccer program, which included three levels of play, involving 141 boys ages 9 to 12, was selected for the study. A questionnaire using the Washington Self-Description Questionnaire, Bailer-Cromwell Locus of Control plus investigator developed scales for importance of participation, role of leadership, and social comparison was administration to the participants. Internal consistency for the investigator developed scales was .65, .59 and .77 respectively. Coaches provided an assessment of player ability and leadership skills. For this analysis level one (recreational) and level three (elite) teams were selected (n=113). Canonical correlations and multiple regression analysis were used to investigate the relationship of the five selected predictor variables with the two leadership assessment variables while controlling for team level. Player assessment of perceived leadership showed importance of participation to be the only significant predictor ($P<.05$) of leadership ability for the recreational participant while self concept was the only significant predictor for the elite players. Using the coaches assessment of participant leadership, self concept and locus of control were significant predictors for the recreational league participants while social comparison was the only significant predictor at the elite level. Zero order correlations resulted in a low correlation ($r=.17$) when comparing the player perceived assessment to the coaches assessment of player leadership qualities. On the elite teams this correlation was $r=.03$. At both levels of play, coaches assessment of leadership was closely related to their assessment of participant ability ($r=.62$ and .71). However participant assessment of leadership when related to ability resulted in lower correlations for both levels of play ($r=.33$) with participants placing greater emphasis on self concept ($r=.17$ to .28). The relationship of self concept to leadership as assessed by the coaches at the elite level was nonexistent ($r=.03$) while at the recreational level it was $r=.33$. Results showed that participants and coaches had different perceptions about participant leadership qualities and that these perceptions may vary as a result of the level of play. Discussion of these results will focus on the expected role of various psychological and participation variables on leadership qualities in youth sport and how this player/coach conflict may impact desired participant outcomes.

BEST COPY AVAILABLE

PSYCHOLOGICAL MOMENTUM AND SKILL PERFORMANCE - A LABORATORY STUDY.

John M. Silva, Allen E. Cornelius, and Laura Finch
Department of Physical Education, Exercise, and Sport Science
University of North Carolina at Chapel Hill

Field studies investigating the effect of psychological momentum (PM) on performance have noted the difficulty in statistically demonstrating a significant effect, especially when skill level is controlled (Gilovich, Vallone, & Tversky, 1985; Iso-Ahola & Blanchard, 1986; Silva, Hardy, & Crace, 1988; Vallerand, Colavecchio, & Pelletier, 1988). This study used a well controlled laboratory setting and a novel motor skill to investigate the relationship between PM and performance. Subjects were paired and placed in a head to head competition format. The task was a series of circle mazes which the subjects were required to fill in as quickly and accurately as possible within a 15 second time limit. Each maze was considered as a game in the competition with the object of the game to complete the maze with fewer errors than the opponent in the allotted time. The scoring system was patterned as a tennis match, with six game wins needed to win a set and a match being best two out of three sets. After each maze was completed the subjects were given false feedback concerning the outcome of that game and the margin of their victory or defeat. This predetermined feedback imposed either positive or negative momentum conditions on the subjects by manipulating their experiences of victory or defeat as the match progressed. The actual performance score and error score for each subject was recorded after each game. At the conclusion of the match, each subject completed a post-session questionnaire that assessed their perceptions about the competition. The results of this questionnaire indicate that the subjects in positive momentum conditions did feel that they had a high degree of positive PM (a mean of 7.22 on a scale of 1 to 10), and that the subjects in the negative momentum conditions felt they had a high degree of negative PM (a mean of 6.37 on a scale of 1 to 10). However, no statistically significant differences were discovered in either the performance or error scores of the two PM conditions. A one-way ANOVA of performance scores and error scores of games subsequent to the conclusion of a set revealed no significant differences between the scores of the group that won the previous set (positive PM) and the group that lost the previous set (negative PM). When the final games in a set were examined, a one-way ANOVA revealed no significant differences in the performance or error scores between the group that was winning the set (positive PM) and the group that was losing the set (negative PM). A regression analysis testing outcome of a set as predictive of subsequent performance also failed to yield a significant relationship for performance or error scores. No apparent trends were observed in performance or error scores for the different groups as the contest progressed. These results are in agreement with the findings of previous research (Gilovich, Vallone, & Tversky, 1985; Silva, Hardy, & Crace, 1988) that PM is a cognitive interpretation of events occurring in a contest that currently is not supported by evidence from performance measures. Either increased sophistication of research designs is necessary to reveal the elusive relationship between PM and performance, or the present conceptualization of PM is too simplistic and must be redefined, or psychological momentum as some researchers have suggested is a cognitive illusion.

SELF-ESTEEM AND ATTITUDES, PERCEPTIONS, BEHAVIOR AND EXPECTED BEHAVIOR, RELATIVE TO DRUG USE AMONG FIFTH AND SIXTH GRADERS.

Michael Young, Susan Rausch and Ken Schriner, Health Education Projects Office, Program in Health Sciences, University of Arkansas.

The purpose of the study was to determine the relationship between self-esteem and attitudes, perceptions, behavior, and expected behavior relative to drug use among fifth and sixth grade elementary school students. Drug education programs often seek to assist children to develop a positive self-esteem. Research relative to the actual relationship of self-esteem to drug use has produced mixed results. This is, in part, because most researchers have utilized a generalized concept of self-esteem. The present study builds on our previous work examining area specific self-esteem and the use and expected use of drugs. As part of the evaluation process for the "Be A Winner" project, students from 12 different elementary schools (N=769), completed project questionnaires. The questionnaire included the Hare Self-Esteem scale (which addresses the areas of school, home and peer self-esteem) and 41 items related to attitudes, perceptions, behavior and expected behavior relative to drug use. The questionnaire had been previously pilot tested to determine readability and clarity of questionnaire items. Questionnaires were administered in a classroom setting by a member of the research team who read each item aloud while students followed along in their test booklets. SAS programs were utilized for data analysis. The general linear models procedure (Proc GLM) was used to determine if there were differences in self-esteem when examined by responses to individual questionnaire items. Tukey's test was used to examine differences between groups means for each item. Results for home self-esteem indicated significant differences in self-esteem by response category for 33 of the 41 drug related items. There were differences for 36 of the items relative to school self-esteem, but only eight of these were significant for peer self-esteem. These results confirm our previous findings, highlighting the important role that the home and the school can play in drug prevention efforts.

BEST COPY AVAILABLE

USING THE THEORY OF REASONED ACTION TO PREDICT PARTICIPATORY AND NON-PARTICIPATORY BREAST SELF-EXAMINATION IN SENIOR COLLEGE WOMEN.

Emogene Fox, Jane Lammers, University of Central Arkansas.

Fishbein's theory of reasoned action was used to predict participatory and non-participatory behavior in regular breast self-examination by senior college women. Seventy-two female students enrolled in a senior general education elective class participated in the study. All responses were voluntary and anonymous. Although the population was a sample of convenience, the response rate was 100%. The survey instrument, developed according to Fishbein's protocol, was completed by all the students. Prior to completing the survey instrument, all subjects participated in an extensive educational program on breast self-examination. Data were analyzed using Wilks' Lamba (U-statistic) and univariate F-ratio to test the four sub-components of Fishbein's model by participation in BSE. Significant differences were found on six questions related to the beliefs about the consequences of BSE and five questions related to the normative factors. A two group discriminant analysis identified five significant predictor variables for the population. Significant predictors (p .01) in rank order were: 1) the personal belief that BSE would aid in detecting tumors (F=18.40); 2) peace of mind (F=16.77); 3) BSE would be helpful in finding abnormalities (F=16.66); 4) BSE would not take unnecessary time (F=15.13); and 5) what my doctor thinks I should do (F=14.24). Since four of the five predictors showing significance were from the attitudinal component of the model, attitudes were determined to be stronger predictors for the performance of BSE than normative factors. Implications from the study include: 1) designing educational programs to target positive attitudes and beliefs reflected in the predictor variables and 2) since perceived physician beliefs affect patient compliance, physicians should be encouraged to promote BSE as an effective means of detecting early breast abnormalities.

USE OF FACTOR ANALYTIC TECHNIQUES IN HEALTH RESEARCH: A META ANALYSIS. Catherine A. Teare Ketter, Georgia College; James E. Eddy, University of Alabama.

The purpose of this study was to conduct a meta analysis of factor analytic techniques in research. A comprehensive literature search was completed using a computer literature data base (MEDLINE) which identified articles published since 1965 employing factor/component analysis as a statistical technique in biomedical and health-related research. Five distinct applications of factor analysis emerged from the literature. First, factor analytic techniques, primarily Principal Components Analysis (PCA), can be used to generate variable groupings which describe symptom severity in studies which analyze similarities among patient symptom presentation. Second, factor and component analytic techniques can be utilized to describe groups of variables which characterize a "normal" situation; this is particularly useful when it is important to recognize an abnormal state. Third, factor analytic techniques can be used to identify groups of variable which are accurate predictors of the relative success of a specific therapeutic/intervention technique. Fourth, factor analytic techniques, Principal Factor Analysis (PFA), can be used for instrument validation. This technique is frequently applied in the development of instruments which assess participant/patient/employee satisfaction. Fifth, factor and component analyses are equally useful in the description of subject/patient attitude or affect. In summary, there are numerous examples of factor analytic technique application in the biomedical and health literature which suggest that this data reduction technique can be useful to the health researcher who is interested in analyzing patterns of variation in data sets containing large numbers of variables.

THE RELATIONSHIP BETWEEN FITNESS ASSESSMENT RESULTS AND EXERCISE ADHERENCE IN A CORPORATE HEALTH AND FITNESS PROGRAM

Bradley R.A. Wilson, University of Cincinnati;
Donald I. Wagner, University of Cincinnati.

During the past decade there has been a significant increase in the delivery of fitness programs at the worksite. However, health improvements associated with exercise are dependent on individual adherence patterns. Although some consideration has been given to factors that influence adherence to these programs, there is still a need for further study in this area. In order to better understand the factors involved with adherence to a fitness program, volunteer subjects (n=74) who were recently enrolled in a Fortune 100 company's onsite fitness program were given a battery of fitness tests prior to the program's initiation. The fitness assessment included a test battery of resting heart rate, age, weight, resting blood pressure, aerobic capacity, steady state heart rate, 85% submax bicycle test, trunk flexibility, grip strength, abdominal curls, body fat percent and cardiovascular risk profile. Adherence to the fitness program was monitored by computer for the first two years that the program was in operation. A stepwise multiple regression was run on the test battery data which identified three variables which were significantly related to adherence (F=8.102, R =0.275, p<.0001). The significant variables for adherence were: 1) older participants, 2) participants with lower cardiovascular risk, and 3) participants with lower percent body fat. A discriminant analysis showed no sex differences. These predictors have implications for the development of adherence-enhancing strategies in corporate-sponsored, onsite health and fitness programs. By being able to identify individuals who are less likely to adhere, program directors can make special efforts to improve their attendance.

PERSONAL PROBLEM-SOLVING INVENTORY (PPSI): APPLICATION AND EVALUATION OF GENDER DIFFERENCES IN ADOLESCENTS

Marianne Frauenknecht, Western Michigan University, and David R. Black, Purdue University

The Personal Problem-Solving Inventory (PPSI) for adolescents was developed based on a theoretical model of problem solving and excessive stress. Social problem solving is a cognitive process that is applied to problematic *real-life* situations for which there is no apparent adaptive solution. Health problems have been linked to deficiencies in problem-solving skills. This is the first evaluation of problem-solving skills of adolescents and gender differences because heretofore an appropriate instrument for adolescents has not been available. The PPSI is a 62-item multidimensional measure of problem solving that is divided into 3 scales, Automatic Processing, Problem Orientation, and Problem-Solving Skills, and 7 subscales: (a) Cognition, (b) Emotion, (c) Behavior, (d) Problem Identification, (e) Listing Alternatives, (f) Weighing Consequences, and (g) Planning/Evaluating/Reorganizing. Psychometric data for the PPSI indicated that validity and reliability estimates are exceptionally high. In general, problem-solving abilities of this sample of 354 high school students was relatively poor compared to test results of older populations. Gender differences were found in specific problem-solving steps. Independent sample t-tests showed significant differences in skills between male and female high school freshmen on the Weighing Consequences subscale, t (348) = -2.78, p < .006. Significant differences were also found on the Problem Orientation subscales of Cognition, t (352) = 2.66, p < .008, and Emotion, t (354) = 3.51, p < .001. In addition, the multiple discriminant function correctly classified 66.67% of the subjects into criterion groups and Wilk's lambda confirmed that the Problem Orientation Scale, and the subscales of Emotion, Behavior, and Weighing Consequences significantly discriminated between the two groups, $X2$ (3, N = 326) = 36.85, p < .0001 (canonical correlation = .33). This research suggests that this sample of high school students would benefit from problem-solving training. Educational programs that tailor problem-solving components seems imperative based on gender differences. Ameliorating specific problem-solving skills may ultimately lead to enhanced health status among teenagers.

THE RELATIONSHIP BETWEEN THE ELECTRICAL ACTIVITY OF THE LOWER LEG MUSCLES AND FOOT IMPULSE PATTERNS IN A BALLETIC VERTICAL JUMP.

Jennifer Stacey, Rick N. Robertson; University of Oregon, Eugene.

The purpose of the study was to investigate the relationship between the activity of the lower leg muscles and the foot impulse patterns in a balletic vertical jump. The study was conducted to investigate proposed associative factors of chronic lower leg pain, namely pronation and heel strike, in relationship to the activity of the selected leg muscles. Three professional ballet dancers were required to jump in first position at three different rates. The subjects were videotaped from the waist to the floor. Knee angle, ankle angle and jump height were subsequently obtained from the video by digitizing five bony landmarks. The IEMG for the gastrocnemius, the peroneus longus, and the anterior tibialis, and four plantar foot impulses for the eccentric contact phase and the concentric contact phase of each jump ($N = 20$) were determined. Within each subject, the Pearson Product Moment Correlation Coefficient was calculated between each muscle and each impulse for each phase and condition. Predominantly positive significant correlations ($\underline{p} < 0.05$) were found in all analyses, with more occurring in the slow conditions. A significant positive relationship was often found between the forefoot impulse and the IEMG of each muscle. These results suggest that a lack of heel strike may load the muscles more than when heel contact is made. The high number of positive correlations for the rear foot impulse analysis suggested that factors other than muscle activation alone, namely the series elasticity, have to be considered as part of the injury prevention mechanism. The highest number of significant positive correlations were found in the analyses involving the medial impulse, indicating that a high level of activity in the investigated muslces can be seen with pronation.

AN INVESTIGATION OF THE NUTRITIONAL AND PHYSIOLOGICAL STATUS AND CHARACTERISTICS OF EATING DISORDERS OF FEMALE BALLET DANCERS AND DISTANCE RUNNERS.

DawnElla M. Braley-Rust, Emporia State University

The purpose of this study was to investigate and compare the nutritional and physiological status and characteristics of eating disorders among female non-endurance (ballet dancers) and endurance (distance runners) athletes. Twenty-five subjects, 14 ballet dancers from the School of Ballet Oklahoma and 11 distance runners from Emporia State University and Emporia High School Cross Country teams participated in the study. The factors measured were caloric intake, estimated aerobic capacity (VO2 Max), body composition, and assessment of characteristics of eating disorders. Caloric intake was obtained by a three-day dietary recall/record (DINE). The Queen's College Step Test estimated VO2 Max. Body composition was obtained by five skinfold measurements and Jackson and Pollock's regression equation. The Eating Disorder Inventory (EDI) assessed the characteristics of eating disorders. T-tests were used to determine if difference existed between groups in caloric intake (kcal/day) and estimated VO2 max at the .05 level of significance. A multivariate t-test (utilizing Hotellings t^2) and follow-up univariate t-test assessed if differences existed between groups in EDI subscale scores. Correlation techniques were utilized to assess relationships of caloric intake, percentage body fat, and EDI subscale scores. There was no significant difference of caloric intake between the ballet dancers and distance runners according to the three-day dietary recall/record. However, both groups exhibited a low caloric intake. There was a significant difference between the estimated VO2 max values of ballet dancers and distance runners. Of the eight EDI subscales only perfectionism was significantly different between ballet dancers and distance runners. It was concluded that caloric intake being equal, the training regimen of the groups was the contributing factor in maintain- ing a low percentage body fat. Furthermore, it can also be concluded that an activity which is based upon sound training principles and nutrition can foster the dance "look" and ideal body weight of a distance runner without entering into the realm of the eating disorders.

PHYSICAL FITNESS, BODY IMAGE, AND LOCUS OF CONTROL IN COLLEGE WOMEN DANCERS AND NON-DANCERS.

Sally A. Radell, Daniel D. Adame, Steven P. Cole, and Thomas C. Johnson, Emory University, Atlanta, Georgia; Maher A. Abbas, Stanford University, Stanford, California.

Given the scarcity of empirical research and the diverse findings of the few studies investigating the relationship of dance to physical performance, body image, and personality, this study assessed the relations among measures of physical fitness, body image and locus of control in college freshman women dancers and non-dancers. Thirty-nine students enrolled in courses in modern, ballet, and jazz dance, and 120 students enrolled in a health course were administered the Hall Physical Fitness Test Profile, the Winstead and Cash Body Self-relations Questionnaire (BSRQ), and the Adult Nowicki-Strickland Locus of Control Scale. The Physical Fitness Test Profile includes measures on resting heart rate, blood pressure, height, weight, muscle strength, percent body fat composition, flexibility, muscle endurance, and aerobic power. The BSRQ assesses perceptions of body image in three domains: physical appearance, physical fitness, and physical health. Results showed dancers were more physically fit, more positive about the physical fitness and health domains of the BSRQ, and more internal in their locus of control than non-dancers. No significant difference was found between dancers and non-dancers on the appearance domain of the BSRQ. Dancers with positive scores on the appearance and fitness domain of the BSRQ were more physically fit than dancers with less positive appearance and fitness BSRQ scores. A significant positive relationship between BSRQ appearance and physical fitness also had been demonstrated for college women ($r = .52$). However, the significant positive relationship between BSRQ health and physical fitness among dancers ($r = .38$) had not been demonstrated among college women ($r = .03$). A significant positive relationship was found between BSRQ appearance and BSRQ health for non-dancers ($r = .39$) but not for dancers ($r = .05$).

DIETARY PRACTICES AND RADIAL BONE DENSITY OF COLLEGE DANCERS.

K.C. Garbe, C.F. Sanborn, N.M. DiMarco & M.H. Samuels
Youngstown St Univ, Texas Woman's Univ, UTHSC San Antonio.

The purpose of this study was to compare the dietary intakes, Eating Disorder Inventory scores (EDI), bone density, and serum estradiol concentration (E_2) of female contemporary dancers to nonexercising females. Twenty-four female contemporary dancers and 32 nonexercising female controls (18-35 years) were selected for the study. All subjects were nonsmoking, white females, and were not currently taking oral contraceptives. The contemporary dancers were enrolled in daily technique courses and rehearsed at least 2 hr/day. A single photon absorptiometer was used to measure bone mineral density at two sites of the radius (distal 1/10, proximal 1/3). Body composition was assessed by bioelectrical impedance and blood samples were drawn during day 7-8 of the menstrual cycle. The subjects were similar in age (23.9 yr), age at menarche (13.0 yr), and menstrual periods per year (11.9). The major differences between the groups were that the dancers were taller, weighed less, and had a lower body fat than the controls (166.5 cm, 162.2 cm; 58.0 kg, 59.8 kg; 25.1%, 28.5%; respectively; $p<.05$). The subjects were similar in daily intakes of kilocalories (1842), carbohydrates (247 g), protein (61 g), and fat (66 g). On the average, the dancers and controls did not meet the RDAs for calcium or iron (731 mg, 13.6 mg; respectively). No significant differences were found in E_2 or 7 of the 8 EDI scales. Bone mineral density scores were similar for the dancers and controls at the radial sites (1/10 = .498 g/cm^2; 1/3 = .694 g/cm^2). While radial bone density was similar, these data should be interpreted cautiously as lumbar bone density was not determined. The absence of menstrual dysfunction among contemporary college dancers may be a result of less emphasis placed on performance.

THE EFFECTS OF PARTICIPATION IN MODERN DANCE ON FRENCH CHILDREN'S ATTITUDES MEASURED BY DOMAIN DISCRIMINATION

Nelson D. Neal, Longwood College
Jeanne Marie Dineur, Institution Saint-Michele

Recent attitude research has suggested discriminating between the three psychological domains because it had been found that differences between groups of subjects may fall within one or two of the domains rather than all three domains. The purpose of this study was to discover in which domain, affective, behavioral, or cognitive, the attitudinal difference between a treatment and control group occurred. The posttest scores of the two groups were compared using an analysis of covariance, with pretest scores as the covariate. Attitudes toward dance of 191 French girls and boys were measured by Neal's Dance Attitude Inventory which had been translated into French. Treatment consisted of participation in four class sessions of modern dance over a six day period. The results indicated significant differences between posttest scores of the treatment and control groups in the affective domain (F[1,182]=5.468, p<.02), in the cognitive domain (F[1,182]=3.971, p<.048), and in total attitude (F[1,182]=6.508, p<.012). There was no significant difference between the posttest scores of the two groups in the behavioral domain. The results illustrated that significant differences between the total attitude scores of two groups of subjects did not mean there was a significant difference between the two groups in all three psychological domains.

This research was supported by the Longwood College Department of Physical Education, Health, and Recreation and by L'Institution St. Michele, Solesmes, France.

HEALTH-RELATED FITNESS IN FIRST THROUGH FOURTH GRADE STUDENTS.

David Q. Thomas, Rice University.

The purpose of this study was to profile the health-related fitness of first through fourth grade students in Massachusetts. Five public schools were randomly selected to represent each of the five geographical regions of Massachusetts. Three hundred forty-eight boys and girls participated as subjects. In each school, one home room class from each grade level was randomly selected. A team of five experienced teacher/researchers collected the data. The **Physical Best** fitness assessment program, developed by the American Alliance for Health, Physical Education, Recreation, and Dance, was utilized to assess the health-related fitness of the students. Test items included measures of body composition by skinfold thickness, cardiovascular fitness by a one mile run/walk, flexibility of the hamstrings by the sit-and-reach test, and muscular strength and endurance of the upper body and abdominals by pull-ups and modified sit-ups respectively. Means, standard deviations, and percentiles were calculated by class and grade level. The results indicated that the students performed best on the test of hamstring flexibility (75% met the criteria) and worst in cardiovascular fitness (25% met the criteria). When analyzed by gender, the boys scored the best on body composition (69% met criteria) and the sit-up (68%) while scoring the lowest (22%) on the cardiovascular assessment. The girls scored best on hamstring flexibility (88%), the sit-up (79%), and body composition (71%), while scoring the lowest on the cardiovascular assessment (28%) and the pull-up (19%). No individual class mean for either gender met the health-related criterion reference standard for the mile run. A total of 12% of the students were able to achieve scores necessary to meet all five of the proposed health-related criteria.

THE PERCENT OF MAXIMAL AEROBIC CAPACITY UTILIZED BY 9-10 YEAR-OLD BOYS DURING THE ONE-MILE RUN/WALK.

Deborah L. Thompson, William J. Vincent, Steven F. Loy, Deborah L. Mutton, George J. Holland, Stephen Shaw. Exercise Physiology Laboratory, Dept. of Kinesiology and Center For Sports Medicine, California State University, Northridge.

Criterion-reference standards for the one-mile run-walk for time (MRWT) have been established for Fitnessgram and AAHPERD Physical Best testing programs. The purpose of this study was to determine the percent of maximum aerobic capacity (%VO2max) elicited by 9-10 year-old boys when performing the MRWT at the pace required to achieve the Fitnessgram criterion time. The %VO2 max values used to develop the Fitnessgram criterion time were derived from adult based data. Thirty one moderately active boys (x age 9.4 yr) were tested as follows: treadmill determined VO2 max (mean ± SD) (48.6 ± 6.9 ml/kg/min); percent fat by skinfold measurement (17.9 ± 3.5); two MRWT on an outdoor track (best time, 9.1 ± 1.2 minutes); two submaximal treadmill runs to measure %VO2 max, at speed determined by 1) Fitnessgram criterion (5.5 mph) and 2) the subject's actual MRWT (x speed 6.6 mph). During the MRWT, subjects' heart rates were measured by Uniq CIC heart rate monitors to determine the percent of maximal heart rate elicited (x percent 92.2). Ninety percent of the subjects performed at or better than the Fitnessgram criterion (11:00 min.) and 74% achieved the Physical Best standard (10:00 min.) for the MRWT. Fitnessgram estimates that a 9-10 year-old boy will utilize 85-90 %VO2 max while performing the MRWT at criterion pace. In this study, average %VO2 max at the criterion pace was 69.9% (range 52-87) and the %VO2 max at actual pace was 79.4% (range 55-100). Given recent cross sectional and longitudinal studies citing 46-55 ml/kg/min as average VO2 max values for boys in this age group, the boys in this study with mean VO2 max results of 48.6 ml/kg/min would appear to be a representative sample of the population. Therefore, it was concluded that the Fitnessgram MRWT criterion (11:00 min.) may not sufficiently discriminate between the lower and higher levels of fitness in the population of 9-10 year-old boys.

THE EFFECTS OF MANDATORY EXERCISE TRAINING ON PHYSICAL FITNESS AND ISCHEMIC HEART DISEASE RISK FACTORS OF FIRE FIGHTERS - A LONGITUDINAL STUDY.

John S. Green and Stephen F. Crouse, Texas A&M University

Although studies concerning the physical fitness and coronary risk status of fire fighters are numerous, most of them are cross sectional with many showing conflicting results. Of particular concern is the variation in the findings when the training programs used as the treatment condition were mandatory as opposed to voluntary. The purpose of this study was to determine how fitness and coronary risk variables changed over time as a result of a mandatory exercise program. After initial risk factor and fitness level assessments, a group of 24 fire fighters began a mandatory but unsupervised exercise program. Fitness levels and risk factors were assessed once a year for each of the subsequent five years. The data was analyzed using a multivariate analysis of variance (MANOVA) with repeated measures. A significant MANOVA was followed by univariate analysis and subsequent Duncan multiple range tests. A statistically significant but negligible improvement in percent body fat (%FAT) and triglycerides (TG) was detected across the five years. Minor differences in total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), and maximum oxygen consumption (VO_2 Max) were statistically significant, but their magnitude was not sufficient to be considered of physiological importance and no clear trend across time was demonstrated. Each of the 5 year means for TC, LDL-C, %FAT, and VO_2 max were all outside of desirable ranges. It was concluded that mandatory, unsupervised exercise programs do not significantly improve the risk factor status or fitness levels of fire fighters and that a significant number of fire fighters demonstrate a higher than average risk for cardiovascular disease.

THE RELATIONSHIP BETWEEN FORMER COLLEGIATE VARSITY SPORTS PARTICIPATION AND OSTEOARTHRITIS

Ronnie D. Carda, Emporia State University; Henry J. Montoye, University of Wisconsin-Madison; Homer Sprague, Michigan State University

Several studies have been conducted, using a variety of sample populations, to determine causes or predictors of osteoarthritis (OA). The causes or predictors most commonly associated with OA are age, obesity and occupational activity. This study attempted to determine the relationship between former collegiate varsity sports participation and the prevalence of OA. A follow-up study design, using information gathered by questionnaire from 706 former college athletes and non-athletes, was implemented. One hundred fifty-five subjects who reported having OA were matched on age, age at death and health status to non-arthritic controls. The variable investigated were age, weight, height, body mass index, health status, occupational, recreational and competitive sports activity. Analyses were conducted using a Cox multiple regression model, Chi-Square, odds ratios, t-tests and ANOVAs. Subjects who had been former varsity runners in college were found to have a higher prevalence of OA than football players and athletes of other sports. Former college varsity football players were found to have a higher prevalence of OA than football players and athletes of other sports. Former college varsity football players were found to have less prevalence of OA than all other former college varsity athletes.

EFFECTS OF HIGH AND LOW INTENSITY EXERCISE ON RESIDUAL VOLUME AND BODY COMPOSITION IN PREVIOUSLY SEDENTARY MEN.

Nicolaas P. Pronk, Robert C. Lowe, Stephen F. Crouse. Applied Exercise Science Laboratory, Texas A&M University, College Station, TX 77843.

Endurance-type exercise training has been shown to reduce residual volume (RV). However, the effect of exercise intensity on RV following exercise training is unclear. RV changes will affect subsequent body composition measurements by hydrostatic weighing (HW), whereas skinfold (SK) or circumference (CI) techniques would not be sensitive to changes in lung volumes. The purpose of this investigation was to study the effects of 2 isocaloric exercise protocols of different intensity over a 24-week period on RV and body composition changes in previously sedentary men. Subjects (N=39; x age = 46.5 yrs) were tested for maximum oxygen uptake (MAXVO2) on bicycle ergometer, body composition by HW, SK (sum of 7 sites), and CI, and RV determination by oxygen dilution technique. Subjects were randomly assigned to high (HI) or low (LO) bicycle ergometer exercise group. Data obtained from MAXVO2 were applied to linear regression techniques to derive the exercise time and workload of each individual. HI (N=20) and LO (N=19) exercised at 80% and 50% of MAXVO2, respectively, at 60 rpm, 3 sessions per week for a total caloric expenditure of 350 kcal per session. All sessions were supervised by laboratory personnel. Although subjects were tested at baseline (T1), 8 wks (T2), 16 wks (T3), and 24 wks (T4), only T1 and T4 data are reported here. Statistical analysis involved MANOVA and, where appropriate, was followed-up by ANOVA and DUNCAN post-hoc tests. All statistics were judged at the 0.05 level of significance. Results are presented in the table below.

GRP	PER	WEIGHT	RV	DENS	%FAT HW	%FAT SK	%FAT CI	MAXVO2
HI	T1	183.3±26.5	1497.6±355.5	1.036±0.011	27.9±4.9	27.5±4.6	24.8±6.2	31.1±7.4
	T4	173.5±20.3*	1264.1±275.6*	1.039±0.009	26.3±3.9	24.6±4.1*	21.6±4.7*	47.0±9.1*
LO	T1	181.1±33.6	1576.7±316.6	1.036±0.009	27.7±4.3	27.5±5.0	24.9±6.1	31.0±4.8
	T4	179.9±33.8*	1349.6±339.1*	1.037±0.009	27.2±4.1	25.6±3.9*	22.5±6.2*	41.2±6.4*

Results are presented as mean±standard deviation; * indicates sign. diff. between T1 and T4;

Neither HI nor LO changed HW values despite significant reductions in RV and WEIGHT. Furthermore, reductions in RV were similar for HI and LO which suggests that exercise intensity had little effect on magnitude of change. WEIGHT changes may have counteracted the RV reduction in the calculation of body density. SK and CI, not dependent on RV changes, were both significantly reduced. These data indicate the need for RV determination when serial body composition measurements are made during periods of endurance-type exercise training.

AUTHOR INDEX

Abadie, B. 99
Abbas, M. 124, 286
Adame, D. 124, 286
Ahia, N.R. 34
Aldana, S. 175, 244
Al Haroun, M. 190
Alles, W. 177
Amato, H. 35
Anderson, D. 238
Anderson, D.F. 29
Askins, J. 263
Bacharach, D. 115, 143, 144
Bahamonde, R. 196
Baldini, F. 205, 212
Baldwin, D. 262
Ball, T. 57
Barber, H. 276
Barfield, B. 132
Barker, B. 49
Barrett, D. 17
Bates, B. 199, 273
Bates, L. 119
Baumgartner, T. 56
Beauchamp, L. 71
Beehler, P. 1
Beitel, P. 193
Berg, K. 160
Bergen-Cico, D. 250
Berkey, D. 72, 73
Bialeschki, D. 240
Birdsall, D. 93
Bishop, P. 155
Black, D. 283
Blessing, D. 136
Blinde, E. 111
Blizzard, A. 22
Boileau, R. 141, 142
Bolonchuk, W. 165
Bonnstetter, R. 68
Boorman, M. 272
Borgen, F. 31
Borman, C. 169
Boswell, B. 230
Bouchier, N. 6
Braddock, D. 220
Braley-Rust, D. 285
Branch, T. 202
Brandon, J. 36, 37
Brezzo, R.D. 272
Brilla, L. 154
Broskoski, M. 231
Brown, J. 78
Bucholtz, D. 155
Buckenmeyer, P. 143
Bunting, C. 39
Burke, J. 3
Burke, J.R. 182
Burke, K. 104
Burkhardt, J.E. 116
Byra, M. 77
Byrd, R. 150
Calvert, R. 104
Cameron, C. 168
Campos, W. 192
Carda, R. 292
Carter, J.A. 248, 253
Caster, B. 199
Cauraugh, J. 134, 195, 208
Chamberland, P. 202
Chambers, C. 130
Champeau, D. 44
Chandler, T. 112
Chase, L. 26
Chen, D. 134, 195, 208
Chen, F. 273
Chen, W.W. 15
Chesmel, C. 93
Chevrette, J. 78
Chitwood, L. 149
Chodzko-Zajko, W. 155
Choi, E-J. 11
Chouteau, M. 262

Christ, C. 141, 142
Church, C. 88
Climstein, M. 61
Cobb, R. 152
Cohen, M. 238
Cole, E. 55, 61
Cole, S. 124, 286
Coleman, J. 234
Colville, B. 161
Coniglione, T. 173
Cook, K. 161
Cool, R. 72
Cooper, R. 205, 212
Corbin, C. 18, 26, 30
Cornelius, A. 278
Crawford, M. 254
Crawford, S. 126
Cress, P. 216
Crews, T. 162
Croce, R. 60
Crouse, S. 140, 148, 291, 293
Cummings, C. 117
Cuneen, J. 107
Cusimano, B. 223
Cutton, D. 85
Cychosz, C. 29, 31, 52
Damitz, S. 170
Daniels, J. 91
Darby, L. 147, 228
Darst, P. 71, 223
Davis, W. 225
DeFrancesco, C. 105
DeFuria, M. 115
Deisinger, E. 31
Dempf, S. 122
Destache, D. 79
Detert, R. 44
DeVoe, D. 69, 229
DiCarlo, L. 164
DiCicco, G. 266
DiMarco, N. 287
Dineur, J.M. 288
Disch, J. 234
Dodds, P. 267
Dolgener, F. 19, 167
Donatelle, R. 43, 45
Downes, B. 125
Duda, J. 95
Duitsman, D. 52
Duncan, T. 275
Dunn, J. 55, 61, 102
Eason, B. 218
Eastman, N. 98
Ebbeck, V. 276
Ebbeling, C. 170, 204
Eby, M. 188
Eckerson, J. 166
Eddy, J. 49, 281
Edmundson, E. 14
Edwards, R. 265
Edwards, W. 251
Eisenberg, J. 28
Elias, B. 160
Ellis, D. 216
Ellis, S. 185
Emeterio, E. 202
Engels, H. 41, 90
Engleman, M. 277
Ennis, C. 63
Erbaugh, S. 194
Erdmann, L. 167
Espinosa, D. 110
Etnyre, B. 130
Evans, S. 166, 201
Evans, V. 21
Evans, W. 210
Ewbank, P. 152
Fairweather, M. 256
Farley, R. 162
Fatouros, J. 143
Faucette, N. 64
Feldman, D. 93
Fernhall, B. 145
Fielding, L. 8
Figoni, S. 59
Finch, L. 274, 278
Fischman, M. 132
Fitzgerald, J. 41
Fitzhugh, E. 49
Fletcher, S. 217

Floyd, J. 117
Folsom-Meek, S. 262
Fort, I. 272
Foster, G. 93
Foti, T. 204
Fox, E. 280
Frauenknecht, M. 283
Fridinger, F. 172
Friesen, R. 88
Fronske, H. 233
Fujiura, G. 220
Fuller, S. 173
Fulton, J. 231
Furney, S. 84
Gabert, T. 97
Gable, C. 235
Gaesser, G. 156
Gallagher, J. 181, 191, 192
Gallahue, D. 190
Garbe, K. 287
Gaudagnoli, M. 186, 239
Gibbs, R. 50
Glaser, R. 59
Golaszeski, T. 174
Golaszewski, T. 9
Goldberg, A. 112
Goodwin, G. 134
Gough, J. 48
Graham, C. 50
Graham, P. 110
Graves, J. 195, 208
Grayson, J. 113
Green, J. 291
Green, R. 271
Greendorfer, S. 111
Griffin, N. 254
Griffith, J. III 128
Gruber, M. 221
Gryder, N. 230
Gulick, K. 19
Gupta, S. 59
Guyton, R. 20
Haden, T. 14
Hale, L. 99
Hall, E. 116
Hall, K. 183
Hallinan, C. 125
Hamill, J. 204
Hamilton, N. 200
Han, L. 111
Harding, A. 43
Harris, H. 89
Hartman, C. 154
Harvey, M. 169
Hautala, R. 70, 215
Hawes, R. 104
Hawkins, M. 217
Haymes, E. 90
Hefley, R. 17
Henderson, K. 240
Hendrick, J. 1, 113
Hensley, L. 19, 167
Heston, M. 103, 190
Heusner, W. 163
Heyward, V. 161
Hicks, V. 161
Higgs, C. 120
Hill, K. 81
Hinson, B. 164
Hofschire, P. 160
Hogan, J. 22
Holbert, D. 12
Holland, G. 290
Hollis, J. 28
Hopper, C. 221
Hornak, J. 152
Horvat, M. 60
Hotard, S. 150
Houseworth, S. 104
Housh, T. 135, 166
Howell, D. 89
Hultstrand, B. 123
Humphries, C. 80
Hupp, S. 243
Hurst, W. 146
Husak, W. 238
Hutchinson, G. 267
Hyner, C. 24
Ignico, A. 252
Immel, S. 27

Ingraham, S. 97
Jackson, A. 137, 232
Jackson, A.S. 209
Jacobsen, D. 140, 148
Jefferies, S. 114
Jenkins, K. 161
Johnson, C. 84
Johnson, D. 21, 22
Johnson, G. 135, 166
Johnson, H. 12
Johnson, J. 142
Johnson, R. 168
Johnson, T. 124, 286
Johnston, J. 218
Kamal, F. 190
Kamen, G. 2, 187
Kaminsky, L. 151, 176
Kanters, M. 242
Keh, N.C. 76
Kellish, M. 143
Kendrick, Z. 93
Kennedy, C. 47, 219
Ketter, C.A.T. 49, 281
Keye, W. 261
Kim, Y. 228
Kinder, J. 135
Kirkendall, D. 101, 106
Knehans, A. 173
Knight, E. 12
Knutzen, K. 154, 197
Koceja, D. 3
Kohl, R. 185, 237
Kolander, C. 38, 113
Korchak, S. 144
Kowalski, E. 224
Kozar, B. 100
Kramer, S. 68
Krane, V. 274
Lacourse, M. 189
Lammers, J. 280
LaMontagna, R. 57
Landin, D. 85
Larimer, A. 189
Larshus, J. 96
Latin, R. 160
Lavay, B. 214
Lecius, P. 227
Ledbetter, J. 137
Lee, A. 76, 81, 253
Lee, D. 149
Lee, E. 157, 158, 159
Leggett, S. 195, 208
Liou, J-C. 15
Liverman, R. 146
Long, K. 157, 158, 159
Looney, M. 53
Lord, R. 100
Lowe, R. 148, 293
Loy, S. 290
Lu, L. 15
Ludwig, M. 32
Lukaski, H. 165
Lund, J. 260
Lyle, R. 24, 42
Lynn, S. 22
Lynn, T. 98
MacConnie, S. 221
Macfarlane, P. 206
MacLeish, M. 205
Magill, R. 183
Malone, C. 101, 106
Maneval, M. 17, 198
Manfredi, T. 145
Manning, T.M. 16
Marks, M. 77
Marques, B. 149
Martinek, T. 127
Massey, B. 142
Matthiasson, H. 124
Mawson, L.M. 88
McCoy, G. 188
McGowan, R. 98
McKenzie, T. 64, 214
McPherson, S. 188
Mead, B. 193
Meaney, K. 265
Mego, T. 138
Mellion, M. 160
Meng, J. 143
Midgett, V. 168

Mikesky, A. 222
Millard-Stafford, M. 153, 164
Miller, C. 45
Miller, L. 8
Miller, M. 191
Miller, R. 174
Modisett, S. 118
Moe, E. 28
Moffatt, R. 149
Montelpare, W. 242
Montoye, H. 292
Mookerjee, S. 94
Moore, W. 58
Moorhead, P. 172
Morgan, D. 91
Morris, H. 2, 182
Morrow, J. Jr. 211, 231
Mortensen, L. 68
Moss, R. 207
Munoz, K. 221
Murray, T. 84
Mutton, D. 290
Nagy, M.C. 51
Nagy, S. 51
Neal, N. 288
Neighbors, M. 20
Nelson, K. 249
Nielsen, A.B. 66, 102
Nielsen, D. 206
Nilson, R. 245
Norton, C. 169
Nowicki, S. 124
Oglesby, B. 272
Olds, R.S. 10
Oliver, B. 115
Olrich, T. 109
Olsen, L. 11, 32
Ormond, T.C. 65
Oslin, J. 268
Ostrow, A. 257
Ovalle, S. 61
Ozmun, J. 222
Paese, P. 84
Pangrazi, D. 30
Pangrazi, R. 30
Parker, M. 80, 118
Partin, C. 202
Pease, D. 277
Pellett, T. 179
Pemberton, C. 80, 118
Perry-Hunnicutt, C. 40
Peterson, E. 170
Peterson, G. 30
Petlichkoff, L. 96
Petray, C. 56
Phillips, T. 198
Pierce, E. 98
Pinheiro, V. 67
Pitts, B. 8
Pivarnik, J. 209, 211
Pliske, R. 33
Pohlman, R. 228
Poindexter, H. 157, 158, 159
Polkis, G. 181
Pollock, M. 195, 208
Poole, W.H. III 178
Pope, C. 62
Poppy, W. 227
Poretta, D. 58
Potteiger, J. 136
Powell, F. 217
Prong, T. 18
Pronk, N. 293
Ptak, H. 198
Pujol, T. 138
Puleo, E. 170
Quatrochi, J. 161
Quinn, K. 197
Radell, S. 286
Randall, L. 83, 263
Ratliff, R. 173
Rausch, S. 279
Reeve, T.G. 186, 239
Reeves, B. 147
Rikli, R. 56
Rimmer, J. 220
Rinehart, E. 249
Rippe, J. 170, 204
Risser, W. 157, 158, 159
Rizzo, T. 225

Roberts, J. 139
Robertson, M. 241
Robertson, R. A. 241
Robertson, R.N. 271, 284
Roby, J. 64
Rogol, A. 210
Rohack, J. 140
Rohner, L. 36, 37
Romack, J. 182
Ross, J. 63
Rosskopf, L. 153, 164
Rovegno, I. 264
Rutherford, W. 18, 26
Ryan, P. 73
Ryska, T. 258
Sabatelle, M. 202
Safrit, M. 54
Salazar-Solis, E. 83
Sallis, J. 64
Samuels, M. 287
Sanborn, C. 287
Sankner, R. 111
Sappenfield, C. 58
Sariscsany, M. 86
Scarborough, N. 130
Scheer, J. 171
Schleppi, J. 5
Schmidt, R. 171
Schmitt, J. 38
Schneider, P. 259
Schriner, K. 279
Schutten, M. 182
Schwab, R. 135
Sedlock, D. 92
Seip, R. 210
Shakarian, D. 255
Shaw, S. 290
Shea, C. 235, 236, 237
Sheehan, A. 129
Sheffield, M. 211
Sherman, N. 209
Sidaway, B. 180
Siders, W. 165
Sidwell, M.J. 107
Silva, J. 278
Silvey, C. 42
Simons-Morton, B. 211
Simpson, S. 241
Singleton, S. 41
Sisley, B. 276
Skinner, J. 212
Slater, A. 46
Slaughter, M. 141, 142
Smith, J. 155
Smith, S. 246
Snead, D. 210
Solmon, M. 81, 253
Sparling, P. 153, 164
Spellman, C. 216
Spencer, S. 251
Spitler, D. 208
Sprague, H. 292
Spray, J. 53
Stacey, J. 284
Steele, K. 239
Steinhardt, M. 119
Stevens, V. 28
Stewart, M. 79
Stewart, S. 35
Stillman, R. 141, 142
Stone, M. 168
Stone, W. 175, 244
Stonecipher, L. 23, 24, 25
Stratta, T. 108
Sullivan, C. 95
Summerfield, L. 33
Suomi, R. 227
Surburg, P. 218, 222, 227
Suryaprasad, A. 59
Sveistrup, H. 131
Szmedra, L. 143
Takei, Y. 270
Tallini, D. 150
Tant, C. 269
Tappe, M. 23, 25
Taylor, L. 173
Testerman, E.P. 150
Thiebaud, K.R. 203
Thigpen, L.K. 203
Thomas, D. 289

312

Thomas, J. 228
Thomas, J.R. 231
Thompson, B. 21
Thompson, D. 290
Thompson, L. 66, 71
Torabi, M. 52
Tramonte, S. 203
Travis, H.R. 35
Tricker, R. 45
van der Mars, H. 223
VanOmmeran, D. 247
Veldhuis, J. 210
Versteeg, B. 169
Videto, D. 35
Vincent, W. 290
Virden, R. 247
Vogler, B. 223
Vollmer, W. 28
Von Duvillard, S. 143
Vraa, J. 118
Wadden, T. 93
Wagner, D. 282
Wagner, L. 201
Walker, D. 249
Wall, M. 28
Walling, M. 82, 128
Wandzilak, T. 68
Wang, M. 32
Wang, P. 213
Ward, A. 170, 204
Weeks, D. 184
Weiller, K. 120
Weinberg, W. 38, 75
Weir, J. 166, 201
Weiss, M. 276
Welch, P. 121
Weltman, A. 210
Weltman, J. 210
Wenos, D. 226
Wenos, J. 226
Wessel, M. 35
West, C. 108
Westerfield, C. 48
Westerfield, R. 138
Whaley, M. 151, 177
Whitall, J. 133
White, G. 17, 198
White, S. 95
Whitfield, K. 100
Whitman, M. 145
Wholeben, B. 117
Wiese, C. 219
Wiggins, D. 4
Wigglesworth, J. 190
Wiley, D. 13
Wilkerson, J. 62, 269
Wilkinson, S. 74, 259
Williams, P. 150
Williamson, K. 87
Willis, C. 157
Wilson, B. 282
Wilson, C. 261
Wilson, D. 232
Wilson, G.D. 136
Wilson, W. 161
Wirth, J. 41
Wise, S. 171
Wood, T. 55
Woollacott, M. 131
Worthy, T. 248, 253
Wright, D. 235, 236
Yen, L. 9
Yoshioka, C. 246
Young, D. 238
Young, M. 279
Zelasko, C. 163
Zhu, W. 54
Zieff, S. 7

The American Alliance
for Health, Physical Education,
Recreation and Dance
1900 Association Drive
Reston, Virginia 22091

ISBN 0-88314-504-9